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Address.

THE NEWER METHODS OF DIAGNOSTIC TECHNIC.*

By FREDERICK T. LORD, M.D., BOSTON.

Most mistakes in diagnosis arise from insufficient attention to the patient's story, neglect in the performance of a complete and searching physical examination or lack of skill in their interpretation. To a certain degree, diagnostic errors are unavoidable, but their frequency is materially diminished by the routine use of a carefully prepared scheme of history-taking and physical examination, elaborated to apply in appropriate detail to certain groups of cases and designed to avoid well-known errors of omission. Proficiency can be acquired and maintained at its highest level only by constant practice and the steady influence of opinions corrected or confirmed.

If we are to secure to its fullest extent the educational value to be derived from our successes and failures, a written opinion should be incorporated in the patient's hospital record after the completion of the clinical data. The limits of accuracy in diagnosis then become more apparent if the case later comes to operation or autopsy. It is obviously impossible at this time to cover the numerous more recent developments which have contributed to the science of diagnosis, with any degree of completeness. I shall, therefore, attempt to consider only certain aspects of the subject.

* Presented at the Annual Meeting of the New Hampshire Medical Society, May 16, 1917.

CERTAIN ASPECTS OF HISTORY TAKING.

An important division in our records, in addition to the older form of the family history, past history, habits, and present illness, deals with the occupational history. At the Massachusetts General Hospital, Dr. Wade Wright has made an investigation of the cases in which the hazards of industry have a bearing on the illness, and out of about thirty-two thousand admissions to the Out-Patient Department during a period of one year, about five thousand were received in his industrial clinic. In four hundred and sixty-six cases there was a definite relation between the illness and the occupation,—a proportion of from one to two patients per one hundred of the total out-patient admissions. Out of this number, of four hundred and sixty-six cases, exposure to lead is shown to be a hazard of chief importance, being represented by one hundred and forty-eight cases.

An important rule in history-taking is to try to make the diagnosis from the history alone, and no history can be regarded as complete until this effort has been made. An inquiry, at times of great value, concerns the evolution of the initial symptoms, a matter the importance of which can be appreciated when we consider how the advent of complications may later confuse the clinical picture. It is, for example, highly desirable to inquire concerning the attendant symptoms in cases with a history of hemoptysis. If it can thus be shown that the bleeding was unaccompanied by other symptoms referable to the lungs or other organs, and was, in fact, an "hemoptysis out of a clear sky," then pulmonary tuberculosis may be regarded as the

probable cause of the bleeding. A history of pleurisy out of a clear sky has a similar significance. In the case of a child with the history of having "swallowed something and choked," an initial dysphagia, with absence of cyanosis, paroxysmal cough, dyspnea and suffocation suggests lodgment of a foreign body in the esophagus. The immediate occurrence of respiratory symptoms, on the other hand, may be the most valuable evidence obtainable that a foreign body has been aspirated. In certain cases there is an initial period of dysphagia, with the later development of cough, dyspnea and cyanosis,—a march of events highly suggestive of a swallowed body which has subsequently ruptured into the air passages. There is a group of cases in which the distinction between bronchial and cardiac asthma can be made only by careful inquiry concerning the progress of the early manifestations. Persistent and increasing dyspnea usually precedes the asthmatic attacks due to cardiac failure, while in true bronchial asthma such attacks are at first isolated and without dyspnea in the intervals between the paroxysms. Chill or chilliness, pain in the side, dyspnea and cough, with bloody expectoration, are common to both lobar pneumonia and pulmonary infarction, but in pneumonia the temperature rises rapidly, and reaches its maximum within a few hours. In pulmonary infarction the temperature rises much more slowly. If this difference in the behavior of the temperature can be determined, it may help to solve the problem.

It is equally important to trace out the progress of symptoms in other than pulmonary conditions. I need only remind you that the diagnosis of coronary sclerosis cannot be made without attention to the significance to be attached to the various features which characterize angina pectoris. Dr. Brickner's description, which you have just heard, of the cord symptoms in certain of his cases of spina bifida, suggests the importance of reverting to the earlier manifestations when there are indications of sensory or motor impairment. A history of the disassociation of sensory perception in the earlier stages of a motor disturbance of the lower extremities is suggestive of unilateral lesions of the cord, and may lead to detection and removal of a spinal tumor. Spasm and tingling, limited to certain motor and sensory areas, preceding more extensive involvement, may be a signal symptom of irritative or destructive lesions of the central motor area of the brain, and serve to define the site of a cerebral tumor. The diagnosis of abdominal lesions must be made for the most part from the history, and the statement of the patient concerning the site, radiation, character, severity and duration of pain, among other features, is of chief importance.

MATTERS PERTAINING TO PHYSICAL EXAMINATION AND THE CLINICAL LABORATORY.

As with history-taking, physical examination must be complete if we are to avoid error, and

must comprise also an examination of the blood, the determination of the blood pressure, a Wassermann test and analysis of the urine, including the sediment, as a routine. Certain cases demand further special regional investigation.

Nervous System. The use of the electric otoscope makes examination of the ear much more readily performed now than formerly, and this instrument should be a part of our equipment. In patients who are gravely ill and whose sensibilities are diminished below the normal, an acute otitis media may develop without symptoms. In the examination of the ears in cases of pneumonia, especially in children, an unsuspected inflammation of the middle ear is not an infrequent finding, and inspection of the ear drum should, therefore, be made in such cases, as a routine.

With the added accuracy which the Wassermann test has brought to the diagnosis of syphilis, it appears that inequality, irregularity and sluggish reaction of the pupils to light is to be regarded as suggestive ofluetice infection, even in the absence of other manifestations of the disease.

The conversion of the ophthalmoscope into an electrical instrument makes it readily available for more general use. This is fortunate, for it should be an invariable rule to examine the fundus before resorting to lumbar puncture and the withdrawal of spinal fluid, so frequently desirable as a diagnostic procedure. Optic neuritis and choking of the disc are important signs of increased intracranial pressure, and when present constitute a contraindication to the withdrawal of spinal fluid without due consideration of the danger. Pressure on the medulla, and consequent apnea may occur from herniation of the base of the brain into the foramen magnum on the release of spinal pressure. In cases suspected of cerebral tumor, with increased intracranial tension sufficient to produce optic neuritis or choked disc, the withdrawal of spinal fluid should not be undertaken if the diagnosis can be satisfactorily established without this means. Similar changes are occasionally observed in the eye grounds in cases of meningitis, however, and caution must not be carried so far as to lead to the omission of lumbar puncture in such cases, and consequent failure in the diagnosis and serum treatment of meningococcus infection.

If syphilis of the central nervous system cannot be excluded without an examination of the spinal fluid, lumbar puncture may be justifiable, even in the presence of changes in the eye grounds, indicating increased intracranial pressure.

In the performance of lumbar puncture for the purpose of obtaining spinal fluid for examination, an important caution should be observed in the choice of an instrument, that it be made of pliable material, which will bend and not break in the course of the procedure. It has been the unfortunate experience of a

number of operators to have a steel needle break, and a part of it remain imbedded and out of reach in the lumbar tissues. I need hardly remind you that the recovery of such a fragment may be difficult or impossible without resort to x-ray examination, and an operative procedure quite out of keeping with the already serious condition of the patient.

The examination of the spinal fluid should include a numerical and differential count of the cells, a test for protein and the Wassermann test. Patients with spinal fluids which contain pus cells should be treated as for meningococcus infection until the cause of the disturbance can be definitely determined. Inasmuch as there is promise of successful serum treatment of influenza meningitis, and the influenza bacillus grows only on hemoglobin-containing media, it is desirable, in the investigation of the fluid by culture, to plant it upon blood-agar, as well as on other media. An increase in and predominance of lymphocytes in the spinal fluid usually mean that chronic meningococcus infection, acute anterior poliomyelitis, tuberculous meningitis or syphilis, is the underlying condition. So far as the diagnosis of syphilis is concerned, this is never complete in suspected and otherwise negative cases until an examination of the spinal fluid has been made. We see each year a small group of cases with negative Wassermann tests on the blood and positive tests on the spinal fluid, as the only certain indication of syphilis.

An increase in the protein content of the spinal fluid may be demonstrated by various means. Noguchi's butyric acid test is performed by adding to one part (0.1 to 0.2 cc.) of the fluid, five parts (0.5 cc.) 10% butyric acid in normal salt solution and heating to boiling. One part (0.1 cc.) of normal sodium hydroxide solution is then added, and the mixture again boiled for a few seconds. In strongly positive specimens a precipitate appears within a few minutes. Weakly positive reactions may appear after a longer period, but if the fluid remains clear after two hours it may be regarded as negative. Nonne's test is applied by adding an equal volume of saturated ammonium sulphate solution to the spinal fluid, which should be free from blood. A positive test is indicated by the appearance of a precipitate within three minutes. Protein reactions are not specific, and serve only to demonstrate pathologic fluids without regard to the character of the underlying cause.

RECOGNITION OF CARDIAC IRREGULARITY.

With regard to cardiac cases, an interesting advance has been made by the use of instruments of precision in the diagnosis and classification of the arrhythmias. After some experience in the comparison of clinical and instrumental findings, it is possible to recognize the types of cardiac irregularity in most cases with-

out resort to polygraphic and electrocardiographic tracings. Of the two relatively benign forms, sinus irregularity is a common, youthful type, characterized by the recurrence of cardiac systoles for a short period at a more rapid rate, this acceleration of the rapidly being followed by an interval of slower beats. Imperfect and missed beats are absent, and the acceleration of rate usually occurs during inspiration, with slowing of the rate during expiration. The second of the two relatively benign types is known as extra-systole, which can be recognized by the occurrence of a beat at a shorter interval than the natural beat, a subsequent longer pause before the next systole, and the resumption of normal rhythm. In the absence of symptoms or other signs of cardiac disturbance, extra-systoles need not be regarded as of serious import. There are three types of arrhythmia which may be taken to indicate more or less serious damage to the cardiac mechanism. Of these, auricular fibrillation is usually easily recognized by the repetition of cardiac beats of unequal intensity at irregular intervals, in a disorderly and non-descript fashion. With pulsus alternans, a strong and weak beat alternate, without disturbance of the orderly succession of the sounds at regular intervals. This type is most easily detected in the course of estimation of the blood pressure by the auscultatory method, the disparity in the strength of the alternating beats being accentuated when on listening for the appearance of the systolic sounds at the bend of the elbow, the strong beat first appears, and then, as the pressure is further lowered, the alternating and weaker beat is heard. In partial or complete heart-block, there is a slow ventricular rate with a more rapid contraction of the auricle. The more rapid auricular beats may be counted in the distended jugular vein. Fluoroscopic examination of the chest may disclose the rapid auricular and the slow ventricular rate. Cerebral attacks are likely to accompany the transition from normal rhythm to heart-block. While the more outspoken types of the arrhythmias are recognizable without instrumental assistance, polygraphic or electrocardiographic tracings may be necessary for the detection of the earlier stages of heart-block and the distinction between extra-systoles and fibrillation and heart-block and alternation.

SELECTION OF DONORS FOR TRANSFUSION.

The increasing frequency with which transfusion is done in secondary anemia, as a life-saving measure or as a preliminary to operation, and in pernicious anemia as a temporary expedient, makes familiarity with the technic of selecting an appropriate donor desirable. Otherwise a valuable procedure will sooner or later receive unmerited condemnation in consequence of a fatality from the mixture of incompatible blood. Detection of incompatibility is not a difficult or complicated process, and in

other than emergency cases transfusion should never be performed without preliminary tests for agglutination. When the selection of appropriate donors is a frequent necessity, it is desirable to follow Moss' (*Journal American Medical Association*, June 23, 1917) method of group determination by testing the blood of prospective donors against Group II and Group III serum, which is kept constantly on hand in the laboratory. It is most important to observe the rule that the corpuscles of the donor must not be agglutinated by the patient's serum. Agglutination of the recipient's corpuscles by the donor's serum appears to be less dangerous. In the absence of stock sera five to six drops of the recipient's, and an equal quantity of the donor's blood may be collected, each in small test tubes, and the serum allowed to separate from the clot. One to two drops of the prospective donor's and the recipient's blood are each mixed with one cubic centimeter of 1.5% sodium citrate in 0.9% salt solution. Two loops of the recipient's serum and one loop of the donor's suspension of corpuscles are mixed together on a glass slide, covered with a cover glass, and watched for agglutination under the microscope. Two loops of the donor's serum and one loop of the recipient's suspension of corpuscles are mixed and similarly tested. Rouleaux formation should not be mistaken for agglutination. Observation for five minutes may be sufficient, but a half hour is a safer limit.

DETERMINATION OF THE TYPES OF PNEUMOCOCCI.

The detection of the types of pneumococci giving rise to lobar pneumonia is a matter which should be taken under consideration in this and other communities. Immunologic and agglutinative tests have shown that there are four principal types of pneumococci concerned in the disease. The treatment of pneumonia due to Type I pneumococci, by the homologous serum, has reduced the mortality of this type of infection from 30 to 8%. Anti-pneumococcal serum for the treatment of Type I infection is manufactured both by the New York City and the New York State Board of Health. The State Department of Health of Massachusetts has requested from the Legislature a sufficient amount of money to provide for the preparation and distribution of Type I serum. As a number of months must elapse after all preparations are made before a potent serum can be obtained from inoculated horses, the present is the time to consider such a provision. We should take heed from the history of the disease, and realize that cases of pneumonia are likely to become much more numerous next winter than ever before. Their incidence is likely to rise in consequence of the increased opportunity for contact infection among troops in the course of our military operations. Pneumonia has not long since been noted to become more prevalent in such crowded conditions of living as among the

negroes employed on the Isthmian Canal and housed in barracks, and among the workers in the mines of the Rand. It is hardly to be expected that the supply of serum for which provision has been and is being made in New York and other places, will be equal to the demand.

EXAMINATION OF SEROUS FLUIDS.

The value of an examination of fluid obtained from the serous sacs is too little heeded. Complicated and expensive apparatus is unnecessary, and such simple tests as the specific gravity, the estimate of the amount of albumen, and a differential count of the cells in such fluids are important aids in determining the cause of the effusion. With pleural fluids, for example, a specific gravity of 1010 or under, and traces to 1% of albumen, usually indicates a hydropic transudate. Fluids with a specific gravity of 1010 to 1015 and from 1 to 3% of albumen are usually passive transudates. When the specific gravity is 1018 or over, and the albumen 4% or more, an inflammatory origin may be assumed. An excess of polynuclear cells in serous fluids of high specific gravity commonly indicates an infection of other than tuberculous origin, while an excess of lymphocytes in such fluids usually means that tuberculosis is the underlying cause.

X-RAY EXAMINATION.

From the point of view of medical diagnosis, radiography is of material assistance in certain cases. Involvement of the paranasal sinuses and concealed pockets of pus about the teeth may thus be detected. The nature of lesions of the mediastinum and the lung can be interpreted with much greater accuracy when, to the clinical features, an x-ray examination can be added. X-ray examination should, so far as possible, be secured in all cases. To improve our technic in the application of the ordinary methods of examination, it should be an invariable rule to incorporate in the record all physical pulmonary findings before the x-ray plates are inspected, and then note the discrepancies between the two methods. It not infrequently happens that more is disclosed by the radioscopic than by the physical examination.

In abdominal cases the use of the x-ray is of great assistance. The findings by this method should be judged with, and not independently of, the clinical features, if their utmost value is to be realized. The method is of greatest service in the medical wards in the investigation of gastric cases. Abnormalities in the stomach can, by this means be demonstrated in practically all cases of carcinoma in its more advanced stages, and a negative x-ray is of great value in excluding such lesions. The x-ray differentiation of carcinoma and ulcer is often impossible. Carcinoma is not yet detected early enough by any means to make the outlook for surgical interference hopeful in other than rare instances.

Peptic ulcer presents a high proportion of successful interpretations, but negative x-ray findings do not serve to exclude ulcer. Gallstones are usually missed by x-ray examination, and we place little reliance on negative plates of the gall-bladder region. In only a small proportion of patients shown by operation to have gallstones have the x-ray findings been undoubtedly positive, and in a large proportion of cases we must still make the diagnosis of cholelithiasis on the clinical features. The x-ray is indirectly of value, however, in helping to exclude peptic ulcer when peptic ulcer or gallstones is in question. Stone in the urinary tract, on the other hand, is shown in almost all cases, especially when, by appropriate means, care is taken to include an examination of its pelvic portions. Progress is constantly being made in the study and interpretation of lesions of the small and large intestine, but chief reliance must still be placed on other methods of investigation.

PROCTOSCOPY.

Lesions of the lower bowel within easy access of the anal orifice can at times be diagnosed by means of proctoscopy when other methods fail. The proctoscope is of greatest value in the early detection of carcinoma in this region. It is simple and easily operated. A small, portable battery affords adequate illumination from the small lamp with which the end of the tube is equipped.

ESTIMATION OF RENAL FUNCTION.

In doubtful cases of disturbed renal function, the phenolsulphonephthalein test is desirable and easily performed. Ampules containing enough of the drug for one test are on the market. Three to four hundred cubic centimeters of water may be given the patient to drink a half hour before the test is made. Six-tenths of a milligram of the phenolsulphonephthalein are injected intramuscularly. The bladder is emptied in one hour and again in two hours after the injection. A sufficient amount of 25% sodium hydroxide is added to each of the two specimens of urine to make them strongly alkaline, and the samples are then diluted with water to a volume of one liter. Comparison of the color of a small portion of the diluted first-hour specimen is made with a color scale and the percentage read off. A similar estimate of the color is made on the diluted second-hour specimen. The sum of the percentage of excretion for the two specimens represents the total eliminated during the two-hour period, and may be taken as a fair index of the function of the kidneys. A total output of from 60 to 85% for the two hours may be regarded as normal. In patients with urinary obstruction the specimens of urine must be obtained by catheter, but in the absence of obstruction the use of the catheter is unnecessary.

TESTS FOR ACIDOSIS.

In diabetes an advance may be noted in the addition of a simple and accurate measure of the reaction of the body in the presence of acidosis by an estimation of the quantity of ammonia excreted in the urine. The determination of the total twenty-four-hour output of ammonia is easily made by means of the Ronchese-Malfatti method.* The test is unreliable, however, when the patient is under treatment by alkali. The ferric chloride test for diacetic acid in the urine is of value in indicating the amount of acid excreted. Other tests for acidosis are thus far too complicated for general use.

DIAGNOSIS OF EARLY STAGE OF SYPHILIS.

Finally, the early diagnosis of syphilis, of paramount importance in successful treatment, is made easily possible without complicated and expensive apparatus by the India ink method of finding the spirocheta pallida. A loop of serum squeezed from the previously cleaned lesion under suspicion is mixed on a cover glass with two loops of India ink,† and the mixture covered with a second cover glass. The two cover glasses are then pulled apart, dried, mounted in balsam, and examined under the oil immersion lens.

* (1) 25 cc. urine in Erlenmeyer flask + 25 cc. distilled water + 10 grams solid potassium oxalate (neutral). Add few drops phenolphthalein. Shake a few times to dissolve the potassium oxalate and titrate with one-tenth normal NaOH until the first pink color is permanent. (2) 5 cc. commercial formalin solution in test tube + few drops phenolphthalein. Titrate with one-tenth normal NaOH until a faint pink color is obtained. (3) Now add the neutralized formalin to the neutralized urine and again titrate with one-tenth normal NaOH until a faint pink color is again obtained. Calculation: No attention need be paid to the amount of one-tenth normal NaOH used in (1) and (2). The number of cc. one-tenth normal NaOH used in (3) multiplied by .0017 equals the number of grams NH_3 in 25 cc. urine. From this result calculate the amount for the 24-hour urine. From 0.5 to 1.0 grams in 24 hours is normal.

† Chin-chin India ink is best.

Medical Progress.

A REVIEW OF THE LITERATURE OF THE LAST NINE YEARS ON THE NEPHRITIS OF INFANCY AND CHILDHOOD.

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ALTHOUGH in the last few years an immense literature has grown up concerning nephritis in the adult, it is surprising to see how little has been written about the condition in children. Nephritis is really an extremely common condition in childhood, following, particularly, the various acute infections to which children are so susceptible.

The following review covers most of the important papers of the last nine years:

Etiology. Hutinel¹ insists strongly that infection dominates the etiology, thus differing widely from nephritis in the adult, in which slow degenerative processes play the chief etiological rôle. This, indeed, is the first important distinction to be drawn between nephritis in the adult and in the child. The nephritis following scarlet fever is, perhaps, the most common type of nephritis in childhood, according to Hutinel, and he believes that the scarlet fever toxin may be relatively harmless to the kidneys unless the factor of cold is added; many cases of scarlatinal nephritis would not develop if the body had not been chilled. The following are a few of the conditions to which nephritis may be secondary:

1. Scarlet fever.
2. Infections of the pharynx [tonsillitis especially important.—L. W. H.]
3. Gastro-intestinal diseases of infancy.
4. Skin infections, especially impetigo.
5. Appendicitis.

Kaumheimer² calls especial attention to the importance of impetiginous skin conditions as etiological factors. Out of 223 cases of acute nephritis seen by him, 39 were unquestionably due to impetigo. In nearly all of these 29 cases the nephritis was of the acute hemorrhagic variety, with edema. The prognosis is good.

Phillips³ also emphasizes the importance of impetigo in etiology. He recognizes two types of nephritis secondary to this condition:

1. A nephritis of transitory character, without edema, or cardiac or uremic symptoms. The urine contains a few casts, and a very few red blood cells, barely enough to give the urine a red color.

2. A nephritis which is more severe, characterized by general anasarca, cardiac or uremic symptoms. He believes that the urine should be examined as a routine in all cases of impetigo.

McLanahan⁴ says that nephritis is much more common in childhood than the textbooks would lead one to believe. He emphasizes especially the fact that nephritis may occur in any infectious disease of childhood. In 15 cases of acute nephritis seen by him, the etiology was as follows: scarlet fever, 4; tonsillitis, 3; "grippe," 4; infectious diarrhea, 1; unknown etiology, 3.

Loeb⁵ discusses nephritis from the point of view of the rhinologist. He arrives at the following conclusions:

1. Acute nephritis results from acute tonsillitis far more often than is usually believed.

2. The symptoms are not manifested until some time after the inception of the disease.

3. There are probably many cases in which a mild nephritis occurs secondary to a tonsillitis, which goes on to resolution without the patient or physician being conscious of its presence.

4. It is incumbent upon practitioners to examine the urine of every case of tonsillitis, not only during the height of the disease, but for some time afterwards, as well.

5. Spontaneous or "idiopathic" nephritis is probably often due to a tonsillitis that has not been considered as an etiological possibility.

6. Chronic affections of the kidney may very well owe their origin to unrecognized acute attacks of nephritis of tonsillar origin.

Loeb wrote particularly with regard to adults, but his conclusions hold good for children even more than they do for adults. The importance of tonsillitis in the etiology of acute nephritis in children cannot be overestimated, and in a series of some sixty cases which we have studied at the Children's Hospital during the last two years and a half, tonsillitis has been by far the most frequent cause of the nephritis.

Frank⁶ studied an extensive series of cases of acute nephritis in early infancy, and brings out especially the facts that no child is too young to have nephritis, and that under the first year of age a large proportion of the cases are of gastro-intestinal origin.

Pribram⁷ reports 4 cases of acute hemorrhagic nephritis following tonsillitis, which were cured by tonsillectomy, without any other medicinal or dietetic treatment.

Classification. Heubner,⁸ from an analysis of 73 cases of chronic nephritis in his wards, proposes the following classification:

1. Chronic hemorrhagic nephritis is a quite characteristic type of nephritis in childhood. In this group the urine contains blood consistently over a long period of time. The amount of blood and of albumin is usually considerable, and casts are present in abundance. This type is nearly always associated with edema, and the duration is years. In some cases the heart is hypertrophied and there is an increase in blood pressure; in some there is none. At autopsy the kidneys of these cases are always large, yellow, and studded with many small hemorrhagic areas.

2. Clinically, the cases of this group are very similar to those of the previous; they differ only in that blood is lacking. In nearly all cases the blood pressure is normal. The duration of this type of nephritis is shorter than that of the hemorrhagic form, and children with it nearly always die after a few months. At autopsy the "large white kidney" is seen.

3. The third group of cases comprises those children with true contracted kidney (chronic interstitial nephritis). This is very rare; in Heubner's 73 cases, only one was of this type. The symptoms are very much the same as in the adult type of chronic interstitial nephritis: high blood pressure, enlarged heart, polyuria, albuminuric retinitis, etc.

4. Chronic nephritis following pyelitis. This also is uncommon, only 6 of the 73 cases falling into this group.

5. The fifth type is a nephritis without edema, in which one would not suspect a nephritis unless the urine were examined. The nephritis may go on for months or years without

being discovered, and when the urine is examined as a routine because the child is perhaps brought to the physician for pallor, loss of appetite or vigor, the nephritis is discovered. The albumin is usually present in only small amounts, but there may be a good many casts and red blood cells, which may vary considerably in number from time to time. In this type small hemorrhages from the kidney are particularly likely to occur from time to time. These hemorrhages nearly always occur during some acute illness, especially tonsillitis, the toxins of which irritate the already diseased kidney. This is a very mild type of nephritis and may last for years. The blood pressure is usually normal. In closing, Heubner says that nearly all cases of nephritis in infants and children, whether acute or chronic, can usually be traced to an infection of some sort.

Langstein and Benfey,⁹ following Heubner's work closely, recognize the following 6 types:

1. A chronic hemorrhagic form, nearly always accompanied by edema. This type of nephritis is the most common and characteristic nephritis that children have.

2. A second form is first shown by edema, but has no blood in the urine. The amount of albumin, however, is very large, and there are many casts present. Infectious processes are likely to be the cause of the nephritis in the first group, but not so likely in the second.

3. True chronic interstitial nephritis of the adult type.

4. A parenchymatous nephritis secondary to pyelitis.

5. A form of nephritis coming on very insidiously, and manifested by general debility of the child. The urine contains a small amount of albumin, a moderate number of casts and leucocytes, and from time to time a few red blood cells. It is very likely to follow scarlet fever or tonsillitis.

6. Intermittent albuminuria—rare, and of very little practical importance.

As can be seen, this classification is essentially the same as Heubner's.

Blackman¹⁰ proposes the following classification, based upon etiology:

1. Of Infancy:

- (a) Of gastro-intestinal origin.
- (b) Due to other infections.
- (c) Due to congenital syphilis.

2. Of Older Children:

- (a) Scarlet fever and diphtheria.
- (b) Other infections.
- (c) Cold, exposure and drugs.

Congenital Nephritis—Nephritis in the New-born. Karsner¹¹ reports a case of congenital nephritis. The child was cyanotic at birth, and died 45 minutes afterwards. At autopsy there was found a well-defined acute parenchymatous nephritis. The etiology could not be determined. Kendall¹² reports a most interesting condition,

which he calls "hereditary familial congenital nephritis." Three out of 8 members of the family in one generation, and 8 out of 11 in the next generation, had nephritis. The condition usually appeared at an early age, and was characterized particularly by recurrent attacks of hematuria, sometimes very severe. Some of the cases seemed to be linked with anaphylactic phenomena, as the attacks of hematuria were likely to be brought on by certain specific articles of fruit, such as blackberries and currants.

Kosmak¹³ reports a case of nephritis in the newborn, due probably to acute intestinal disturbance. The child was breast-fed, but developed a severe diarrhea a few days after birth, and died two weeks later. At autopsy an acute parenchymatous nephritis was found. Kosmak believes that the intestinal disturbance was caused by an infection of the milk in the milk ducts, and that the nephritis was secondary to this.

Chronic interstitial nephritis, although very rare, may occur in children, giving the same general picture as that of the adult type. It seems to occur more frequently in England than elsewhere, and most of the cases have been reported by Englishmen. An especial characteristic of this type of nephritis is the coexistence of infantilism, and the term "renal infantilism" has been applied to the condition. Barber¹⁴ reports two cases in the same family, in children 12 and 14 years old, respectively. These children showed the characteristic infantilism. Both children were only 4 feet tall, and much underdeveloped in every way—a height of 4 feet would correspond to a child about 8 years old. There was polyuria in both cases, and the urine was of a very low gravity (1003.6), containing a very slight trace of albumin, and a rare cast.

The blood pressure in these two cases was not elevated, nor were the aortic second sounds accentuated. [Rather unusual; usually a high blood pressure.—L. W. H.]

One of the children died in uremia, and at autopsy the kidneys were found to be very small, histologically showing a typical chronic interstitial nephritis. The etiology was obscure.

Naish¹⁵ reports a similar case in a girl 9 years old, who weighed only 32 pounds, and was infantile in every respect. At autopsy both kidneys together weighed only 30 gm. Berkley and Lee¹⁶ report a case in a boy 10 years of age. He was first seen on account of so-called "bilious attacks," in which he had a good deal of dizziness, vomiting, and headache. There was marked albuminuric retinitis. The heart was considerably enlarged, and the aortic second sound was loud and ringing. The systolic blood pressure was 250 and the diastolic 190. The urine was of low gravity (1005) and contained a heavy trace of albumin, and many hyaline and granular casts. Death occurred 3 weeks after leaving the hospital. There was no autopsy. There are, perhaps, between 20 and 30 additional cases of this condition reported in the lit-

erature, which would be tedious to enumerate.

Miller and Parsons,¹⁷ in an excellent discussion of "renal infantilism," recognize two distinct groups of cases:

1. Renal infantilism with organic renal disease (chronic interstitial nephritis).
2. Renal infantilism without organic renal disease (diabetes insipidus).

In those cases with organic renal disease the degree of infantilism is variable, but is usually marked. The mental development corresponds to the stature. Polyuria and polydypsia are present, and the urine is of very low specific gravity. It may sometimes contain no albumin, and the only evidence of renal disease shown in the urine may be casts in small numbers. The degree of vascular change varies considerably, and may be all the way from no cardiovascular changes up to marked cardiac hypertrophy and very high blood pressure. The etiology is obscure; syphilis seems to play no part. The condition may be congenital. The prognosis is poor, and death practically always results in a short time.

Cardiovascular System in the Nephritis of Children. Hutinel¹ says that cardiac disturbance is common in acute nephritis, being shown especially by irregularity and dilatation. The blood pressure may be elevated in the acute stage, and usually subsides with the subsidence of the infection.

Baginsky,¹⁷ by clinical methods, could find no evidence of heart hypertrophy in any of his cases of acute nephritis. Friedlander,¹⁸ on the other hand, found evidences of considerable cardiac hypertrophy in a number of cases of scarlatinal acute nephritis that came to autopsy. Wessler,¹⁹ using the fluoroscope, found that there was a distinct cardiac hypertrophy present in all his cases of nephritis, both acute and chronic, and that it often developed as early as two weeks after the onset of the nephritis. Nobécourt²⁰ reports 12 cases of nephritis in infants, with the following conclusions regarding the state of the cardiovascular apparatus:

1. The blood pressure was elevated in all acute cases.
2. In the chronic cases the pressure was found to be less than the pressure in normal children of the same age.
3. In acute nephritis there is likely to be cardiac dilatation, and in chronic cases there may be hypertrophy, or there may not be.

Gordon,²¹ from a study of 9 cases, concludes that the blood pressure is usually elevated in both acute and chronic nephritis in children.

As can be seen, there is considerable difference of opinion among the various writers as regards cardiac hypertrophy and increased blood pressure. It is always desirable, in dealing with such a problem, to have data based on a large series of cases, and the trouble has been that not enough cases have been studied to

warrant any definite conclusions as regards the blood pressure and the size of the heart in the nephritis of children. Thus, nothing was definitely settled concerning the blood pressure until Berkley and Lee,²² after an extremely careful study of 93 cases of both acute and chronic nephritis in children between 2 and 12 years, reached the following conclusions:

1. The blood pressure is elevated in the nephritis of childhood, and occasionally to a marked degree. This applies to both acute and chronic nephritis.
2. Systolic and diastolic pressures are not increased to the same extent, the former averaging about 20 mm. Hg., and the latter about 10 mm. above normal.
3. The pulse pressure is increased, but the factor is not constant.
4. The blood pressure in chronic nephritis shows no constant elevation above that in acute nephritis.
5. The blood pressure may, in rare instances, be of prognostic value.
6. No relation has been found to exist between the blood pressure and the urinary findings.
7. Patients having marked edema showed a slightly higher average blood pressure than those with little or none. The difference is not great enough to warrant any definite conclusions.
8. Albuminuric retinitis is probably not common, even in cases showing a marked increase in blood pressure.

Functional Tests. A few years ago the dominant note in the study of nephritis was the histological anatomy of the kidney. At present this is considered very slightly, the main point of interest being the kidney's functional capacity. An immense amount of work has been done, and an enormous literature has developed in the last ten years, dealing with studies in the function of the diseased kidney; most of this work, however, has been done with adults, and very little with children. It is to be expected that the results with children would not coincide with those in adults, as the damage to the kidney is so different.

The phenolphthalein test of kidney function is probably the most valuable single test that there is, and is the one which has been most widely used.

Leopold and Bernhard,²³ in a series of 50 children free from renal disease, found that the phenolphthalein excretion for two hours varied between 50 and 96%, with an average of 70%. These cannot be taken as normal children, however, as many of them were suffering from such conditions as pneumonia or acute endocarditis, in which there might, possibly, have been some kidney insufficiency. Five cases of acute nephritis and five of chronic nephritis were studied. In both the acute and chronic cases the phthalein excretion was diminished. No conclu-

sions can be drawn from a study of such a small series of cases.

In a series of 50 children free from renal disease, the same authors found the following apportionment of the non-protein nitrogenous constituents of the blood. The total non-protein nitrogen varied between 19 and 40 mgm. per 100 cc. of blood, the average being 28 mgm.; the urea nitrogen varied between 8 and 21 mgm., the average being 12 mgm.; the uric acid varied between .6 and 3.2 mgm., the average being 1.8 mgm. The creatinin varied between .5 and 4 mgm., the average being 1.5 mgm. The blood of 16 children with renal conditions was examined. In acute nephritis the non-protein nitrogenous constituents were found to be within normal limits, and in chronic nephritis they were usually increased. [May be considerably increased in acute nephritis; may be normal or increased in chronic.—L. W. H.]

Leopold and Bernhard arrive at the following conclusions:

1. Figures for the non-protein constituents of the blood, as well as for the phthalein excretion of children free from renal disease, are practically identical with the figures obtained from adults, and vary within the normal limits as the adult figures vary.

2. The changes in these figures in children the subjects of renal disease correspond with the changes observed in adults.

3. The importance of the tests for diagnosis and prognosis, amply demonstrated in adults, will in all probability hold true for children, although a more comprehensive series of cases is required definitely to establish this view.

Tileston and Comfort²⁴ found that the phthalein excretion for normal children varied between 78 and 81%, while the non-protein nitrogen of the blood varied between 22 and 26 mgm. per 100 cc. of blood. They investigated three cases of acute nephritis, the phthalein tests being 39%, 56%, and 54%. The non-protein nitrogen of the blood in these cases was, respectively, 64, 34 and 24 mgm. per 100 cc. blood. They arrive at the following conclusions:

1. "The determination of the total non-protein nitrogen and urea of the blood is of great assistance in the diagnosis of uremia, and as a guide to the treatment of nephritis, a marked increase in these substances indicating actual or impending uremia, and calling for a diet low in protein. In the diagnosis of nephritis it is inferior to other methods, because many cases of nephritis show no retention of nitrogen.

2. The phthalein test is very valuable in the diagnosis of nephritis, showing probably better than any other one method the degree of impairment of renal function. In the diagnosis of uremia and as a guide to diet it is inferior to blood analysis, for a low phthalein output may occur without retention of nitrogen.

3. These investigations of the blood and of the phthalein excretion would appear to indicate a better secreting capacity of the child's kidney as compared with that of the adult.

Another test which has been used extensively with adults is the addition of a known amount of urea or sodium chloride to a diet which has been kept constant from day to day, and determining how much of the added salt or urea is excreted in a given time, usually twenty-four or forty-eight hours. This test has been applied in a few instances to children.

Noeggerath and Zondek²⁵ investigated six cases of nephritis in children by this method, with varying results; in the severe cases there was retention of salt and nitrogen; in the mild cases none. They believe that these tests are of considerable value in prognosis.

Bosler²⁶ tried the added salt test, as well as the lactose and potassium iodide tests, on 8 children with nephritis, and concluded that the results and significance of the tests were about the same as for adults.

Nobécourt,²⁷ following the ideas of his countryman, Widal, emphasizes the importance of salt retention in causing edema, and cites the case of a child, who, while getting rid of edema with no other treatment than a salt-free diet, passed 39 grams of salt in 8 days. He attempts to classify nephritis in children on a chemical basis, again following the teachings of Widal, and recognizes several distinct groups, according to whether the kidney inefficiency is for salt or nitrogen, for neither, or for both.

Kinloch,²⁸ working particularly with scarlatinal nephritis, concludes that there is a long-continued inefficiency on the part of the kidney to excrete chlorides, and an inefficiency of nitrogen excretion in the acute stages. Cutter and Morse²⁹ studied two cases of nephritis in children, with especial reference to creatin and creatinin retention, and found that there was none.

Zondek²⁹ believes that it is impossible sharply to separate salt and nitrogen in considering the functions of the kidney. Each influences the other, and in a given case there may be inability to excrete one of these substances if the other is present in the food in considerable amounts, but if the intake of one is cut down considerably, the excretion of the other proceeds without difficulty.

As a summary it may be said that so little work has been done as regards the functional capacity of the kidneys of children with nephritis, that it is not at all certain that these children can be compared in any way to adults, or that the various tests which have proved of such value in adults will be of so much value in children.

Prognosis. The question of prognosis is, perhaps, the most important and at the same time the most perplexing point to consider.

Ernberg³⁰ located and examined 40 out of 106 adults who had had acute nephritis before the

age of 15 years, mostly in connection with some acute infection, and found normal urines in all. He examined 16 out of 50 adults whose acute nephritis had occurred between the ages of 15 and 30 years, and found that all were normal except 4. Two of these gave evidence of nephritis of recent origin; the other two, whose original attack had been subacute rather than acute, showed albuminuria. He concludes as follows: "If these figures give us a true picture, we certainly have been unduly pessimistic about the prognosis of acute nephritis in childhood."

Apert²¹ is not so optimistic; he says: "In infancy and childhood there is great power of compensatory hypertrophy and repair for the kidney. This explains how, in infancy, the renal function may be apparently recovered, giving the appearance of complete cure, and how the kidney, none the less, once injured, is always very delicate, and is likely to be reinjured easily, and to give way at the return of any infection, however slight it may be." Thus it is possible that a good many of the cases of nephritis that we see in adult life may have originated in early life, and the end picture may be the result of the separate attacks of toxins of various acute infections upon a kidney whose power of resistance is already below par.

Hutinel²² believes that nephritis in children nearly always tends toward recovery, whereas in adults it tends the other way.

Treatment. As regards treatment there is little new. All are agreed that rest and a diet which will throw as little strain on the kidneys as possible is the best treatment. Some writers still advocate the old milk diet, but the majority realize that an exclusive milk diet is not desirable, as it does not furnish enough nourishment, and may contain too much protein for the kidney to handle.

A few men recommend diuretics to increase urinary secretion and get rid of edema, but most writers are agreed that in the acute stages of nephritis, at any rate, diuretics do more harm than good. The French writers, Nobécourt and Hutinel especially, believe in the great efficacy of a salt-free diet in getting rid of edema. The teachings of Martin H. Fischer, that nephritis is due to an acid condition in the kidney, and that large amounts of salt should be given, are not generally accepted by most clinicians.

Hutinel gives a summary of important principles in treatment: "As a résumé let me insist that in dealing with these nephritic children it is especially important to pay attention to careful nursing and hygiene. It is by these measures that the condition is cured, or in the more serious forms that life is prolonged. Use drugs as little as possible. Especially is it important not to irritate the kidney, and to forbid the patient eating any substances whose end-products he cannot eliminate. It is necessary, moreover,

to do away with any coexisting infection, however insignificant it may be, and to watch carefully the mouth, digestive tract, respiratory apparatus and skin. In a word, one must remember that the kidney is delicate, and spare it as far as possible."

Edebohls' Operation. The operation of stripping the capsule from the kidneys for the cure or relief of nephritis, first proposed by Edebohls, is discussed by Morse.²³ He reviews 23 cases of nephritis in children in which this operation was done. The end-results of the 23 cases were as follows: "As a result of the operation, two of the cases have been apparently permanently cured, one of them being well and with a normal urine after nine years, and another after eight months. Another was well for two years, and then died of an acute nephritis in no way connected with the previous illness. Two others were well as long as they were under observation, but the time was too short to consider them cured. Nine others have been so much improved by the operation, or, at any rate, the improvement began immediately after the operation, that they have been symptomatically well for months or years, instead of chronic invalids, as they were before the operation. These patients have not, of course, been cured, and will certainly die some time or other of their disease. Nevertheless, the addition of months or years of apparent health seems amply to justify the operation in these cases."

From a study of his own cases and of those which he has collected from the literature, Morse arrives at the following conclusions:

"Edebohls' operation is of much value in properly selected cases of nephritis in childhood. It may save life and result in permanent cure in acute nephritis. No child ill with acute nephritis should be allowed to die, therefore, without giving it the advantage of the chance offered by this operation. It may prolong life for considerable periods in a not inconsiderable number of cases of chronic nephritis, and may, possibly, in rare instances, result in a cure. It should, therefore, always be considered in all cases of chronic nephritis in childhood, which are not doing reasonably well under medical treatment."

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Original Articles.

DIAGNOSIS OF FOCAL SEPSIS.*

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THAT both acute and chronic systemic or localized complaints may result from a pre-existing infectious focus has long been definitely known. The significance of chronic septic foci as an essential causative factor of disease, however, was not fully appreciated until the knowledge of the profession had been enriched by the labors of Miller¹, Rosenow², Billings³ and Hartzell⁴. Indeed, recent advances in this class of affections have caused the profession to view many diseases from a different standpoint.

We are still in great need of higher standards of knowledge of the subject of focal infections, both from the clinical and pathologic aspects. It follows that use is to be made of any and every source of information for diagnostic purposes. The ultimate aim should be to recognize these primary septic foci before the systemic consequences become well established.

In approaching the subject of the diagnosis of primary focal infections, it is to be recollected that in a large percentage of the systemic diseases of which they may be the apparent cause, *e. g.*, chronic nephritis, arterial fibrosis, myocardial degeneration and arthritis—other factors, as heredity, occupation, intemperance in eating and drinking, syphilis, gout and the like, may play an important etiologic rôle. When any of the latter causative agencies are operative in the particular case in hand, it is not possible to determine precisely the significance of an associated chronic infectious focus, more particularly since these may at times remain latent for a long period of time.

On the other hand, it not infrequently happens that a spontaneous cure of the primary focal infection, or that its removal surgically, leads to recovery, hence the recognition of the condition is a matter of the utmost importance.

At the outset, it may not be amiss to mention some of the commoner examples of acute and chronic diseases which are caused by local septic foci. Among the former are generalized tuberculosis, rheumatic fever, endocarditis, pericarditis, myocarditis, septicopyemia, gonorrheal arthritis,

cholecystitis and appendicitis, while the chronic diseases thus produced embrace arthritis deformans, myocarditis, myocardial degeneration, arterial fibrosis, chronic nephritis, septicopyemia and many others.

While, as is well known, the infectious foci, acute or chronic, may occur anywhere in the body, it must not be forgotten that they may be multiple, and under these circumstances may be, at times, classified into primary and secondary; and an attempt to distinguish the former from the latter is always to be made, although this is sometimes impossible.

For example, if the lymph glands of the neck are found to be the seat of a septic focus, we may reasonably infer that the infection has passed from a primary focus elsewhere, *i. e.*, from the tonsils or teeth to these structures, therefore secondary foci occur in this situation, as a rule. The secondary foci exert an aggravating effect upon the clinical features of the condition, hence they assume diagnostic importance and should, whenever possible, be discovered.

It is also of diagnostic advantage to associate the grouping of clinical features in the particular case with chronic septic foci in certain organs. For example, the primary infectious focus in chronic arthritis deformans, acute rheumatic fever, chorea, endocarditis, gastric ulcer, appendicitis, myositis, myocarditis, and glomerulonephritis is usually located in the head, in the guise of tooth-root disease (periapical abscesses), sinusitis and acute or chronic tonsillitis.

In 1887, Mantle⁵ first pointed out the relation of the tonsils as a portal of entry to rheumatoid infection,—an observation confirmed by the recent researches of Poinson and Paine.⁶ In cases of suspected gonorrheal arthritis, an examination of the genito-urinary tract (posterior urethra, prostate, seminal vesicles, renal and perirenal area, pelvis of the kidney, bladder) should reveal the seat of the focus. Acute miliary tuberculosis points to chronic foci in the lungs or thoracic lymph glands.

Unfortunately, we have not as yet an accurate knowledge of all the sites of septic foci in the body nor of the percentage of the cases in which the disease germs gain admission through these dangerous gateways.

Lane⁷ has attempted to fix professional attention upon the abdomen—colonic infection—but as Morris⁸ pertinently remarks: "We are not to concentrate our attention upon the colon in searching for focal infections. We must look over the periphery of a large circle of causes in order to find a possible focus which is sending out toxins that are being excreted at a certain point where there is a selective cell affinity for these toxins."

The internist should not neglect to examine the lungs and pleura for the primary focus in obscure septic states, more particularly if the latter are preceded by lobar pneumonia. An abscess may be found either in the lungs or in one

* Read before the American Climatological and Clinical Association at Lakewood, N. J., May 29, 1917.

of the pleural sacs. The expert gynecologist may discover the initial lesion in the uterus, the tubes, ovaries or glands of Bartholini.

The clue given by the character of the disease, however, may fail to reveal the primary focus on painstaking, thorough investigation in the supposed location. Frank Billings⁸, whose name is inseparably associated with the subject of focal sepsis, pertinently observes: "The failure to find a focus in the expected situation should indicate an extension of the field of examination until it shall have been found."

Goadby¹⁰ aptly states that "in many mouth infections, an exceedingly small local cause may produce suddenly generalized and widespread infection without apparent exacerbation of the mouth-disease preceding such infection."

Says Daland¹¹: "The diagnosis of mouth sepsis should be made by a specially skilled dentist, as a rule"; and in his opinion, I, in the main, concur. There are not a few obscure cases in which a consultation between a dentist and physician is to be advised and encouraged. In this connection, Dr. E. F. Everett¹² pertinently remarks: "There remains much to be unearthed in regard to these conditions, which can be accomplished only by the hearty co-operation of one profession with the other."

In suspected cases, the service of the x-ray expert is also required, but no amount of x-ray evidence, taken and considered separately, is ever sufficient for a reliable diagnosis, nor to furnish a basis for treatment. The results obtained by the roentgenologist must be weighed in connection with the bacteriologic findings, anamnesis and the associated symptoms. While bacterial cultures from the gingival surface will usually yield pathologic types of bacteria, they are "not an index of focal infection located in the dental alveoli or tonsils." (Billings).

In these cases and those brought under suspicion by the roentgenologist, the specially skilled dental surgeon should investigate into the pulp canal from apex to the extreme base. Not only so, but the periapical space should be aspirated and the material withdrawn examined microscopically and culturally.

The infected area or alveolar abscess may be entered either through the root canal or by passing over the exposed neck of the tooth involved, after removing the "tartar," and any exudate that may be present, penetrating as deeply as possible. The discovery of one of the salivarian group of streptococci, *e. g.*, the viridans, hemolyticus or mucosus, sets the question of the diagnosis of a septic focus at rest, but does not establish its specific relation to the general infection.

Obviously, if the pathogenic bacteria found in the outlying infected tissues do not differ from those discovered in the local focus, the etiologic connection between the local condition and general disturbances is reasonably well established.

In this connection, the studies of Hartzell and Henrici¹³ are of much interest and importance. They state "that the streptococcus viridans is the only organism found constantly in chronic alveolar abscesses and in the great majority is present in pure culture." They have at times found other organisms, particularly the white staphylococci and fusiform bacilli, but they believe that these are secondary invaders and practically devoid of pathogenic action.

These observers continue: "From acute abscesses we have recovered hemolytic streptococci on one or two occasions, but the majority of our cultures, from lesions where free pus occurred, have yielded staphylococci (also hemolytic at times), and the fact that these staphylococci have usually been found associated with the mouth streptococci, together with histological findings in the affected tissues, lead us to believe that many of the acute abscesses indicate a secondary invasion by staphylococci with a suppurative process implanted upon the primarily granulomatous lesion. Occasionally, purulent infections are found where other organisms are apparently the etiologic factor, such as the pneumococcus, diphtheroid bacilli, Bacillus fecalis alkaligenes, Bacillus pyocyaneus, etc.; such infections are not common, nor can they be considered characteristic dental lesions." If future observations by other bacteriologists confirm those of Hartzell and Henrici, the recognition of mouth sepsis will have received a decided impetus. The inoculation of animals with strains of the organisms mentioned above, obtained from the foci, is to be urged, since the general pathology and symptomatology of a particular septic condition may thus be elucidated. Such laboratory demonstrations have been carried out successfully in recent years in connection with a limited number of affections, more particularly acute rheumatic fever and chronic arthritis.

A diagnosis, however, is usually reached by a far easier route by physicians than the foregoing methods would indicate. Unhappily, many practitioners have fallen into the error of making hasty inferences based on inaccurate and superficial observation. This fact can be amply confirmed by the experience of those who have, at the suggestion of the physician or roentgenologist, removed the primary focus, with the expectation of effecting a cure, but without permanent success.

As elsewhere stated, "Attention cannot be too strongly drawn to the fact that before consulting an expert dentist, in cases in which mouth sepsis is suspected, the physician in charge must, by a process of exclusion, eliminate all foci of infection other than those that may be present in the mouth."

"In these preliminary examinations, the advice of a competent nose and throat specialist is always necessary. Without observing this precaution, either before or after consultation with a skilled dentist, with a report of the re-

sults, an unfair advantage is taken of the dental profession.^{17,18}

In cases in which the focus is located in the sinuses and tonsils, the diagnosis of the local condition must be made by a skilled and progressive nose and throat specialist, who should not omit from his studies of the particular case a careful cultural examination of any exudate that may be obtainable from the focus. This method of investigation is to be pursued by the clinician with all thoroughness when primary foci are found in other portions of the body than the head, *e. g.*, the lungs, pleura or gall-bladder.

In some obscure cases of focal sepsis, the diagnosis resolves itself into a bacteriologic study of any vaginal, uterine and urethral discharges (the latter being obtainable at times only by massage of the prostate gland and seminal vesicles), as well as of a microscopic and cultural examination of the feces, sputa, urine, pleural or synovial exudate and even the blood. For example, strains of streptococci, which may invade the walls of the intestines, have been found in the intestinal flora. Furthermore, such focal infections, be they slight or extensive, may, particularly if encapsulated, produce the features of a secondary systemic infection. With these thorough laboratory studies must be combined an equally thorough, general examination, including a careful anamnesis.

I cannot forego an opportunity to urge that great care and caution are required to avoid ascribing to primary focal infections, systemic conditions due to other major causes that may be operative. Neither is the practical fact that a local focus, *e. g.*, a frontal sinusitis, may be secondary to and dependent upon a primary general infection to be overlooked. Such foci may disappear with the subsidence of the systemic features. On the other hand, they may tend to persist and thus become an aggravating cause of, and greatly prolong, the general symptoms.

In concluding, the diagnosis of a primary focus embraces the discrimination of non-focal infections and the establishment of its seat and particular etiologic variety both from a clinical and bacteriologic viewpoint, supported by reliable x-ray findings in many instances, and also expert opinions in the cases of tonsillar and sinus involvement. The fact is to be re-emphasized that x-ray studies should supplement, and not displace, other methods of diagnosis, particularly in cases of mouth sepsis. In the present state of our knowledge, it would appear that the diagnosis of a primary oral focus demands the isolation of the streptococcus viridans.

Lastly, the relation of chronic septic foci to systemic diseases does not as yet stand upon a sure and lasting foundation.

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BRUCK'S SERO-CHEMICAL TEST FOR SYPHILIS: A REPORT OF 400 CASES COMPARED WITH THE WASSERMANN REACTION.*

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AND

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THIS new test for the diagnosis of syphilis by C. Bruck¹ has aroused universal interest. The scientific standing of Bruck and the simplicity of the technic led us to overcome our prejudice, that has been the offspring of the numerous tests that have been offered of late. Bruck states that since the discovery of the complement-fixation test for syphilis by Wassermann, Neisser, and himself in 1906, he has been trying to find a simple chemical reaction that would take the place of the complicated technic of the Wassermann reaction. This method, as he has published it, was worked out and is being used at the front, in the present war, where complete laboratory equipment is not available.

Commencing our experiments with a great deal of skepticism, we were much surprised at the results obtained, which are given below. Whatever may be the final status of the test in the determination of syphilis, we feel that there is a great deal of interest in the fact that this simple chemical reaction does pick out certain differences in the composition of blood sera, and that apparently a large number of syphilitic sera differ in their chemical composition percentage from the majority of non-syphilitic sera.

The technic, while exceedingly simple, offers many chances for errors and individual variations so that we have thought it well to give directions and cautions at some length.

Bruck's² technic is described as follows: "The test is made with 0.5 cc. clear serum in a test tube, to which is added 2 cc. of distilled water, and the whole shaken. Then, with a precision pipette, 0.3 cc. of the ac. nitr. purum of the German pharmacopeia is added, and the whole thoroughly shaken and then set aside at room

* Being Contribution of the Massachusetts Commission on Mental Diseases, Number 191 (1917.11). Bibliographical Note.—The previous contribution (1917.10) was by H. C. Solomon, entitled "The Behavior of the Wassermann Reaction in Cases Receiving Mixed Treatment," published in *Medicine and Surgery*, May, 1917.

temperature for ten minutes. Then 16 cc. of distilled water at room temperature is added, and closing the tube with the finger, it is shaken up and down three times carefully, not vigorously enough to make it foam. This is repeated ten minutes later, and the tube is then set aside for half an hour. By this time the precipitate is entirely dissolved in the tube with the normal serum, while the syphilitic serum shows a distinct, flocculent turbidity. In two or three hours, or better still, in twelve hours, the gelatinous and characteristic precipitate is piled up on the floor of the test tube."

The acid is prepared by diluting the Acidum nitricum of the U. S. P. (Sp. gr. 1.403) with distilled water until the hydrometer shows the specific gravity 1.149, which corresponds to the nitric acid of the German pharmacopeia, but since this requires a special hydrometer, a simpler method is to make a 25% solution of the Acidum nitricum, which will give about the proper specific gravity.

The serum is obtained by allowing 10 cc. of blood to stand at room temperature for an hour, and then centrifuging. Serum that has stood for some time may be used as well as the fresh, and even bloody serum does not seem to confuse the results to any great degree. The serum gives the same results with or without inactivation. Post-mortem blood gave results as constant as that obtained during life, in the few cases that we had in this series. But the reaction may be influenced markedly by the size of the test tubes. We have found that the 13 x 1.9 cm. is the most favorable size.

When one first thinks of this test it appears very simple and probably somewhat crude as a chemical reaction, but there are certain precautions that must be observed, and several hundred normal and syphilitic sera should be tried before the investigator can feel that he has a refined routine technic. There is the personal equation which must be watched, for here is probably the greatest source of error, and readily explains why two different persons get widely varying results with the same sera if they have done only a few dozen tests. We must take it for granted that the reaction is a quantitative one, where some positive reactions may differ only slightly from the normal non-syphilitic, and, furthermore, any normal serum may be made to give a positive reaction, and almost any positive serum be made to give a negative by improper manipulation at some point in the test. There are as many places for error to creep in as there are steps in the process. Bruck has omitted many details in his publication, which allow personal variations, and so we have tried to develop a routine process that will eliminate as many of these as possible.

We shall here attempt to explain the methods which we have found most satisfactory and at the same time indicate the places where error is likely to occur. The 0.5 cc. of serum is added

to 2 cc. of distilled water, and shaken thoroughly. Now add slowly exactly 0.3 cc. of acid from a precision pipette, care being taken that it does not flow down the side of the tube. The tube should be shaken gently while the acid is being added, for this prevents the formation of a flocculent precipitate in normal serum which is difficult to dissolve later. After the acid is added shake each tube gently to make sure that these flakes do not persist. It is difficult to shake each tube in exactly the same manner, as must be done if we expect uniform results.

The first 250 tests of this series were made by allowing the tubes to stand for ten minutes as Bruck advocates. Then we found that practically all sera gave a positive reaction if allowed to stand 15-20 minutes, and so in the other tests of the series an attempt was made to make the reaction more sensitive by allowing the tubes to stand only 6-7 minutes. During this time the tubes should be shaken gently once or twice. The manner in which the 16 cc. of water is added also influences the reaction. If allowed to flow freely in upon the precipitate, the positive may be forced into solution as well as the negative. Both pipette and tube should be slanted and the water allowed to flow down the side of the tube without disturbing the precipitate. If all has gone well up to this point, we may see a marked difference between the normal and syphilitic precipitates, in that the normal will begin to go into solution at once, thus clouding the water, while a positive precipitate will be composed of large flakes which show little or no tendency to go into solution or cloud the water above. It must be remembered that the most flocculent positive precipitate will go into solution if the fluid is splashed or shaken too hard while the tube is being inverted. If any doubt as to the character of the precipitate now exists, it may be allowed to stand ten minutes longer, and again inverted as before, or even repeated several times during the next hour or two. We see no reason why the tubes should be left to stand over night, for during this time a precipitate usually settles in the normal tubes. This, however, differs from the syphilitic precipitate in that it is still finely granular and goes back into solution readily when the tubes are inverted.

In view of these possible grounds for error, it is only logical to run controls of known positive and known negative sera along with each group of unknown bloods, and even then certain tubes will seem doubtful, in which event the test should be repeated, with added precaution to see if a definite positive or negative reaction may be obtained.

In the last tests of this series we seemed to aid the reaction by rendering the serum-water solution alkaline by one or two drops of 10% potassium hydroxide before the acid was added.

The positive sera have a larger precipitate, while the normal seem to dissolve more readily.



PLATE 1.—THE APPARATUS NECESSARY FOR THE TEST.

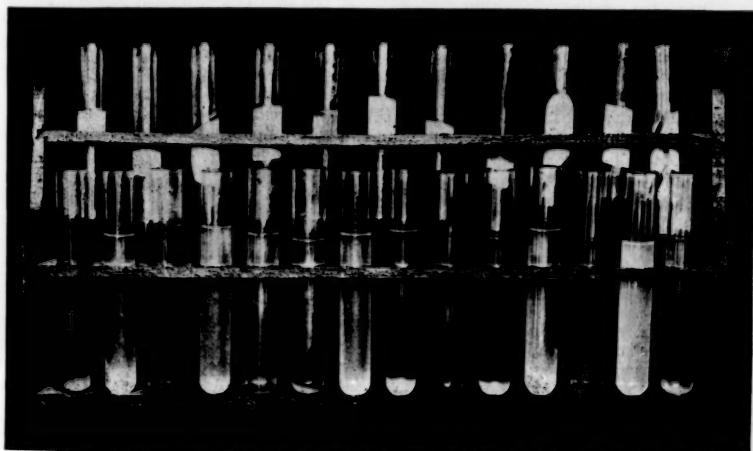


PLATE 2. (Read from left to right).

Tubes 1, 8 and 10 show strongly positive precipitates with clear fluid above.
 Tubes 2 and 4 strongly positive reactions where tubes were inverted immediately before taking picture.
 Tubes 3, 9, 12 and 14 show negative sera in clear solution.
 Tubes 5 and 13 show negative sera in cloudy solution.
 Tubes 6 and 14 show precipitate that may occur in negative sera if allowed to stand over night.
 Tubes 7 and 11 show positive sera with clouding above the precipitate.

TABLE I.

SYPHILIS: NERVOUS SYSTEM INVOLVED.

<i>General Paresis:</i>	
Wassermann and Bruck agree positively	47
" " " " negatively	7
" " " " at variance	10
<i>Tubes Dorsalis:</i>	
Wassermann and Bruck agree positively	3
<i>Cerebrospinal:</i>	
Wassermann and Bruck agree positively	8
" " " " negatively	3
<i>Juvenile Paresis:</i>	
Wassermann and Bruck agree positively	1
<i>Summary:</i>	
Wassermann and Bruck agree positively	50
" " " " negatively	10
" " " " at variance	10

TABLE II.

SYPHILIS: NERVOUS SYSTEM NOT INVOLVED.

<i>Syphilis:</i>	
Wassermann and Bruck agree positively	12
" " " " at variance	5
<i>Congenital Syphilis:</i>	
Wassermann and Bruck agree positively	3
" " " " negatively	2
<i>Summary:</i>	
Wassermann and Bruck agree positively	15
" " " " negatively	2
" " " " at variance	5

TABLE III.

NON-SYPHILITIC: WASSERMANN REACTION NEGATIVE.

Doubtful or positive Bruck.	86
Bruck test negative	216

TOTAL FOR THREE GROUPS.

Wassermann and Bruck agree positively	74
" " " " negatively	230
" " " " at variance	101

The tests here reported were made on blood sera obtained from patients admitted to the Psychopathic Hospital and its Out-Patient Department. As a routine Wassermann test is made on each patient who enters the hospital, it was only necessary to take another tube of blood from each patient, and the results checked in each instance with the Wassermann reaction. As it takes several days to get the report from the Wassermann laboratory of the State Board of Health, there was no chance of being prejudiced by a previous knowledge of the Wassermann reaction. The cases for the most part were those of mental disease; the majority in good general physical health.

A comparison of the total number with the Wassermann reaction shows that there was a general agreement of 304 of the 405 cases tested, or a percentage agreement of practically 75%. In considering the cases of syphilis of the central nervous system in a group by themselves, we find that the agreement is closer, since 69 of the 79 cases tested, or 87%, agreed without any question of doubt. It will be noted that in several cases of general paresis, the Wassermann reaction, which was repeated at intervals, was negative, and in most of these cases the Bruck test was negative also. Our few cases of congenital and latent syphilis also checked very closely with the Wassermann test. In the

various groups of mental cases in this series, no factor of interference was discovered. It is also of interest that in the cases where the blood was obtained post-mortem, the Bruck test agreed with the Wassermann result obtained on ante-mortem blood serum. Further work on post-mortem sera will be reported. Some of the patients not included in the syphilitic groups that have a negative Wassermann and no clinical signs of syphilis, give a history of previous infection at some time, which might partly account for the variations in the two tests.

CONCLUSIONS.

1. We present results of the Bruck serochemical test in 405 cases. In 101 of these cases there were definite clinical manifestations of syphilis, in which the Wassermann and Bruck tests agreed positively in 74, or 75%. The two tests agreed negatively in 12 instances, and were at variance in 15.

2. In the group which showed syphilis of the nervous system we had 64 cases of clinically certain general paresis, of which the Wassermann and Bruck tests agreed in 54 instances, or practically 85%. In other forms of central nervous system involvement the agreement was 100% in the 15 cases tested.

3. In the cases with no apparent involvement of the nervous system the agreement was somewhat less, being 76%. This may be in keeping with the fact that the Wassermann test was not so strongly positive in these cases.

4. The advantages of the test are: (1) the short time required to do the test, (2) the limited amount of apparatus necessary, and (3) the simplicity of the technic.

5. The disadvantages of the test seem, for the most part, to be bound up in the personal variations that are apt to occur.

6. We are here dealing, most probably, with a quantitative chemical difference in the protein content of syphilitic and non-syphilitic sera, the nature of which is not understood by us. It is our hope that this may be brought to light in the near future in the field of chemistry.

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PARESIS OR DEMENTIA PRECOX*

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THE question of nomenclature must arise from time to time, as our knowledge of disease-processes increases. The question of nomenclature in the psychoses is an especially difficult

* Read in different form at the Conference on Neurosyphilis and its Treatment, held at the Gratton State Hospital, Worcester, Mass., Nov. 17, 1916. Title at that meeting: "Demonstration of Specimens in a Case of General Paralysis Having Catatonic Symptoms."

one, owing to the processes dealt with and owing to the slight amount of knowledge which we possess with regard to the normal functioning of the human mind. More recently this question has been brought to the fore in psychiatry by reason of the advances made possible by the discovery and use of the Wassermann reaction, and it is with this small part of the question of nomenclature that we are concerned in this paper.

The Wassermann reaction, as applied with the blood and spinal fluid in the psychoses, has given mental medicine a decided advantage by showing it the true extent of the syphilitic process. We have come to a fuller realization of the truth of the old statement that paresis can stimulate any mental condition. But since the discovery and use of the Wassermann, and with these the discovery of the extent of the inroads of lues, the diagnostician has become careless in his nomenclature. Every case of syphilis of the nervous system is called paresis, in some locations, and even in the most advanced centres we hear of only two sorts of neurosyphilis,—the parenchymatous and the vascular connective-tissue types.

Of course, this is the logical thing to have expected, for we know that the diagnostician is concerned chiefly with treatment and it was felt at first, that the designation "paresis" was sufficient for his purposes. Later the term "syphilis of the central nervous system" was found to state the facts better, and, as the results of treatment and of further anatomical studies appeared, it was found that the division of syphilis of the central nervous system into the parenchymatous and vascular connective-tissue types had a practical bearing for prognoses.

But nowhere do we find an attempt to classify cases as to their psychosis, that is, as to the predominance of one group of mental symptoms as against another. The diagnosis of paresis is now made on the finding of the positive Wassermann reaction in the patient's blood and spinal fluid, together with a pleocytosis and the presence of abnormal chemical constituents in the latter. Of course, I am not taking into consideration the border-line cases here.

It is this attitude of calling all such cases by the above set of titles which should be modified shortly. There are several reasons why this attitude should be changed, not the least of which are theoretical reasons. There are certain practical reasons, chief among which is the question of prognosis. We are told that the vascular connective-tissue types are more amenable to treatment than the parenchymatous types; that we may arrest the process, but that we cannot expect to replace injured or dead nerve cells. This is all doubtless true, but it is theoretically equally true that some nerve cells are more vital to the animal economy than others. And it is this consideration of the groups of nerve cells

injured which should also be of value in making the prognosis.

We have some evidence that it is perhaps a question of nerve cells injured rather than one of connective-tissue as against parenchyma, for we know that certain cases show more mental impairment than others, even after the disease-process seems to have been arrested. And we know now that something more than the therapeutic test is essential in order to give the correct prognosis; it being usual to claim that those which improve are the connective-tissue types, and those which do not yield so readily are the parenchymatous types.

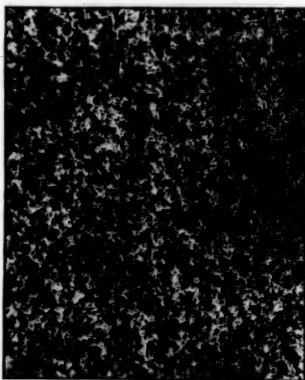
The chief question which has been neglected is whether the process is chiefly forward of the Rolandic fissure or behind it, and whether it is chiefly in the cortex or in the fiber pathways in the white matter. We are all aware of the differences in physiology between the pre- and post-Rolandic regions, and I hope that we are all familiar with the significance of these two great regions for psychiatry. May there not be a difference in the vital necessity between the motor needs and the sensory needs of the human organization?

In addition to the practical aid in prognosis which may be offered by a consideration of the brain region affected, I would propose an equally practical reason for such consideration in the aid which it might give the study of dementia precox, which is fast finding its real anatomical foundation. It is felt in certain quarters, for example, that the region affected in the catatonic form of dementia precox is the post-Rolandic. If this is true, is it not conceivable that any process which affects this region to a sufficient degree should give rise to the catatonic syndrome? Is it too much to suppose that the syphilitic process may give rise to the catatonic syndrome, if it affects the post-Rolandic regions severely enough? As a matter of fact, the presence of dementia precox and of paresis in the same individual has been noted long before the Wassermann reaction was discovered, but, at that time, it was thought advisable to consider the two as distinct entities in the same patient. Now we can consider the whole as one process which has involved the groups of cells and fibers which subserve the two mental pictures.

Case W. S. H., No. 28853, was such a case. The patient's mental trouble began at the age of 28 years with an exaggeration of his previous dissolute habits. After about 6 months, he developed auditory hallucinations, thought he was to be killed, became destructive, maniacal, and went out of doors improperly clad. At admission, he talked volubly and quickly, but showed some impairment of memory. He was easily distracted and his flow of thought was rambling. He had high ideas about his ability to sing, and altogether acted in a manic way. He gradually passed into a catatonic state, showing negativism, muscular rigidity, refusal of food, inconti-

nence. Yet physical signs were noted early, their significance not being fully realized, and with the appearance of the positive tests for lues on the blood and spinal fluid, the diagnosis of paresis was made, though the first diagnosis had been manic-depressive insanity, manic phase, and then dementia precox. The patient finally developed convulsions and died at the age of 30, after a duration of about 2 years of the acute symptoms.

The pathological examination of the brain with the Scharlach-R stain for fat in twenty-four sections from each side of the brain, showed that the chief deposition of fat was in the white matter of the post-Rolandic convolutions. While such a finding in a single case could have little meaning, it assumes great significance when considered in connection with the other facts stated above.



CASE W. S. H.—White matter of supramarginal gyrus. Shows enormous amount of fat (black). Scharlach-R stain.

It seems proper, then, that we should call those cases paresis which show the mental picture and the physical signs of paresis, whether they have the positive signs of syphilitic infection or not. It seems equally fitting to me that we should call those cases dementia precox which have the mental and objective signs of dementia precox, regardless of whether they have a syphilitic infection or not. For only in this way can we hope to think and act clearly in the splitting up of the dementia precox group, which seems to be well under way, and only in this way, perhaps, can we solve the question of why certain paretics recover with more dementia than others, why some are less amenable to treatment than others, and, finally, why some have negative findings for lues.

FURTHER OBSERVATIONS ON SHOCK AT THE FRONT.

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[From the Laboratory of Comparative Physiology in the Harvard Medical School.]

I.

IN my first communication on "Shock at the Front," I recorded measurements of blood pressure made in the first-line trenches at Neuport on the Yser. The blood pressure in soldiers on duty there was normal. But at Neuport there was no offensive, save the habitual bombardment. Fortified perhaps by habit, life under fire had become an uneventful round. It is true that the bomb, the trench torpedo, and the high explosive shell took their daily toll. The spectacle of mangled men stirred pity, but failed to change the even pressure of the blood. It might not be so in a fierce barrage. There, I was told, when drum-fire fills the air with a continuous roar and hillsides smoke under the bursting shells, the arterial pressure sinks, and turns toward shock. Upon the wound, the weakened guard gives way, the pressure falls profoundly, and life is at once in jeopardy. An alluring speculation! Yet long experience has shown that, with regard to the circulation, speculations have no value except as incitements to research; only measurements have real worth.

The Great War does not lack material for such measurements, but admission to the tragedy is difficult. To request an order to proceed to a spot where an attack is being made is of no use. The attack will be over before the order can be issued by the necessary bureaus. It is essential to have authority to pass anywhere on the battle front. On May 20, 1917, I received from the Ministry of War, with the consent of the General commanding the — army, an order giving me complete freedom of action and specifying that I was to receive every assistance in accomplishing my researches on traumatic shock. A month later this was supplemented by a priceless order from Grand Quartier Général extending these privileges to other armies. These magical papers opened every door. I am deeply indebted for them. But I am still more indebted to the consideration and kindness shown me in the — and — armies by men of every rank, from stretcher-bearer to Commanding General.

This is not the place to set forth my adventures. It is enough to say that on May 22 I found myself about 300 metres from the crest of Mont Blond, one of the low summits in the Massif de Moronvillers, a long ridge which commands the plain beyond Chalons-sur-Marne. The strategic importance of this ridge is very great. In April it was still held by the enemy. The French offensive against the Massif began April 16. Owing probably to insufficient ar-

tillery preparation, this first attack failed; little or no ground was gained, and the losses were very heavy. One ambulance, of which I knew, prepared for 3000 wounded; they received 18,000. Since that date, the French have won all the ridge except that part above my station. On May 25, the French finished the job. It was a beautiful and interesting operation. I quote from a letter written on my knee during the last hours of the battle:

"My *poste de secours* was dug by the Germans. It consists of a cellar about 8 by 10 feet, and 6 feet deep. The roof is proof against fragments, but not against direct hits.* A ladder leads to a cave, 7 by 8 feet, the floor of which is 15 feet below the surface of the ground.

"Yesterday afternoon, at three o'clock, the French began to prepare for storming the crest of Mont Blond—the white ridge just before my eyes. In an hour the Germans made up their minds that an assault was intended. The artillery fire, which was continuous before, now swelled to a torrent. Each side placed a barrage. The German barrage covered the little valley behind the crest. We were on the slope nearest the crest. The bottom of the valley was about 150 meters from us, consequently we were within the barrage. Between four o'clock and midnight, more than 10,000 heavy shells fell within a radius of 1000 feet from our cave. I took the count from time to time with my watch. We were driven at once into our deeper refuge. The little stuffy hole was packed with men, knee to knee; stretcher-bearers, surgeons, my orderly, and myself. The three surgeons played *baccarat*. I sat on the edge of a plank and watched the game. We had an acetylene light. The shells fell all around, shaking the place and repeatedly putting out the light. The noise was remarkable. The air was filled with screams, hisses, and loud reports, followed by the slide of masses of earth. Many shells were so close that a strong push of hot gas was felt. At six o'clock the Moroccans took the ridge by storm. At midnight the bombardment slackened but did not cease. With the dawn the wounded came in a stream. They were laid in the upper room. The wounds were of all sorts. The worst was a completely crushed jaw, in a man with a dozen slighter wounds. One man had a hole through the temple into the brain,—a hole two inches long and half an inch wide. Another had a smashed leg, a bad head, and in the thigh a wound the size of a small orange. I watched the blood pressure carefully. Imagine a cellar with a plank floor covered with clay an eighth of an inch deep. A horrible tub full of bloody dressings. Two stretchers on the floor. Ten men in a space 8 by 10 feet, shoulder to shoulder. Two candles. Sand-bag walls. The roof so low that I am always hitting my helmet against the beams. The

air thick with the smell of blood, sweat, alcohol, iodine, vomit. Everywhere a smear of clay—the chalky clay of Champagne. The continuous scream, roar, crash of shells. A rain of small stones, dirt, pieces of steel. Every few seconds a profound trembling, as a shell strikes closer. Four men passing bandages and iodine in the half light, over backs, under arms. The cries of the wounded. The litter of bloody garments. The fresh cases, obliged to lie outside, under the fire, until the room is cleared. The brancardiers, bent under the load of the stretcher, slouching off with the dressed wounded. The dawn, the failing moon, the thick vapors and acrid stench of the barrage. The blasted hillsides smoking under the continual rain of death. Countless fresh shell holes all around us. The graves reopened.

• • •

They are bringing down the dead. They lie sprawling on the slope just below us, half sewed up in burlap, like pieces of spoiled meat."

In spite of these conditions, of which I have made a faithful report, the blood pressure remained normal, not only in the unwounded men, but also in the wounded. Yet many of the wounds were grave.

My previous observations at Nieuport, at the Mort Homme, and on the Somme, showed that the blood pressure is not lowered under the habitual bombardment. These new observations show: (1) that the blood pressure is not lowered under a barrage fire, said to be as violent as the worst in the great drive at Verdun; and (2) that shock probably is not immediate, but develops some time after the wound.

II.

In a second communication² in this JOURNAL, the discovery was recorded that fat embolism is a cause of shock. This discovery was based on my producing typical shock by the injection of olive oil into the jugular vein of animals. It was supported by the known facts: that shock is most frequent after fractures of the femur and after multiple wounds of the subcutaneous fatty tissues; that fat embolism of the brain and other organs has been observed after such wounds; that the injection of oil into the veins is followed by fat embolism.

During the last week of May, 1917, I collected at Mourmelon-le-Petit sufficient observations to support strongly the statement that fat embolism is the principal cause of shock.

Mourmelon-le-Petit is a small village in the plain of Chalons-sur-Marne. It is the seat of an *ambulance de triage*—a sorting station. To this station, which is within shell fire of the German lines, are brought all the wounded from a number of *postes de secours* on the Massif de

* Two days after my departure, a shell entered the *poste* next mine, killing the two surgeons and five of the stretcher bearers.

Morenovillers. At this *triage*, I saw more than one thousand freshly wounded. Aside from a few abdominal cases, in which there was probably direct injury to the vasomotor nerves of the abdominal vessels, the only shock was that caused by fracture of the femur or by multiple wounds of the subcutaneous tissue—cases in which fat embolism undoubtedly took place.

From June 23 to June 30 I was at Vauxtin, seat of a *triage* behind the Chemin des Dames. Here again were the familiar scenes: the balloons hanging like carrion birds above the heights, the aeroplanes, the fuming barrage, the wrecks of men cast up by the waves of field-grey Germans that beat in vain against these fiery slopes, the stream of ambulances bringing their freight with the regularity of butchers' carts. And here again was the clearest evidence that shock is rarely seen except where fat embolism is known to be present or where the vasomotor nerves of the abdomen are injured.

III.

In a third communication³ in this JOURNAL, experiments were recorded in which the low blood pressures of shock were raised 15, 20 and even 30 millimeters of mercury by increasing the aspiration of the thorax. When an animal suffering from shock is made to breathe an atmosphere rich in carbon dioxide, the action of the respiratory pump may be doubled or trebled. The blood is sucked from the engorged portal veins into the heart and the arterial pressure is raised.

The following cases of shock, observed at Vauxtin,* illustrate the value of the respiratory treatment in man:

CASE 1. June 25, 7 a.m. Both legs amputated. Diastolic arterial pressure 51 mm. When carbon dioxide was inhaled until the quantity of air entering the chest was about doubled, the diastolic pressure rose to 60 mm. At 11 a.m. the patient was out of danger.

CASE 2. June 26, 8.25 a.m. Two deep wounds in the back. Multiple wounds elsewhere. Diastolic pressure, 53 mm. Inclined position and hot normal saline in vein caused pressure to rise to 70 mm. Operation at 10.15 a.m., lasting a quarter hour. At 10.30 the diastolic pressure was 52 mm. An injection of adrenalin brought it to 57 mm. for a short time only. At 11.05 the pressure was 53 mm. At 11.15 the respiration was deepened by inhaling carbon dioxide; 11.20, diastolic pressure 60 mm.; 11.25, carbon dioxide was stopped and the pressure thereupon fell to 53 mm. At 11.35, the gas was again employed and the pressure rose to 61 mm. This man recovered.

CASE 3. June 29, 6 a.m. Right leg crushed. Many small wounds through subcutaneous fat. Diastolic pressure 47 mm. Injections of normal

saline solution in vein at elbow did not raise the pressure. Either injected under the skin also produced no effect. Increased respiration from inhaling carbon dioxide at once increased the pressure. The pulse, which could scarcely be felt at the wrist, became plainly stronger. At about 11.30 a.m., during carbon dioxide breathing, the leg was amputated under local anesthesia, and the multiple wounds dressed without anesthesia. There was no unfavorable reaction, though under ordinary conditions (without carbon dioxide respiration) the operation would almost certainly have been fatal. Several hours after the operation, this man's femoral pulse and heart action were so good that he was believed out of danger. The carbon dioxide respiration was discontinued. In about ten minutes, the respiration became feeble and the pulse less strong. The carbon dioxide was at once renewed, but the respirations did not become stronger, and in ten minutes more the man was dead, in spite of the carbon dioxide atmosphere. He was from the beginning a case ordinarily called hopeless.

From these cases it appears that increased respiration from the administration of carbon dioxide is of advantage in shock. In my experience it has not failed to raise the blood pressure, even in profound shock.

In the observations at Vauxtin, the head of the wounded man was placed in a wooden box, the length, breadth and height of which were each about 35 cm. The end for the neck was in two pieces. The lower piece was fixed and had a semi-circular opening for the back of the neck. The upper piece was movable. It had a semi-circular opening for the front of the neck. This piece slid down upon the neck like a guillotine. Cotton was placed between the edges of the openings and the skin. A hole of about 2 cm. in diameter was made in each of the two sides of the box. Cotton was placed in these holes to regulate the amount of carbon dioxide and air. The carbon dioxide entered one of these holes. It came from a cylinder provided with a regulating valve. On its way it bubbled through a water bottle. The volume of gas employed was judged by the number of bubbles per minute. Enough gas was used to double the respiration. The patient was in the inclined position, the feet 30 cm. higher than the head.

I believe it would be of advantage to use the carbon dioxide during operations.

Great care should be taken to discontinue the carbon dioxide respiration very gradually.

Carbon dioxide breathing may also be given without any apparatus except the box. In that case, the patient produces his own carbon dioxide.

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* These observations were presented to the Académie des Sciences, July 9, 1917, and appear in the *Comptes rendus* of July 23, 1917.

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126 Massachusetts Ave., Corner Boylston St., Boston, Massachusetts.

THE POSITION OF ANTISEPTICS.

REPORTS from surgeons at the front show that radical readjustments of their views on antiseptics are constantly being made. Dakin's solution and his Chloramine-T in particular seem to have met with much unfavorable criticism. The objections to their use come under two headings. The first and most important objection is that as prophylactics these preparations have proved highly uncertain. Accordingly, in French army orders published in the *Bulletin et Mémoires de la Société de Chirurgie* of June 19, surgeons are requested not to use hypochlorite powder as a prophylactic in cases of gas gangrene. The rule appears to be based on sound knowledge, for in his investigations Kennety Brown was unable to observe any action of the solution on the gas bacillus. He states that sodium hypochlorite is not specific against this organism. More recently Sir Almroth Wright has said that Dakin's solution possesses little antiseptic power. Similarly, it is averred by

the French surgeons, Le Grand and Delbet, that while Dakin's solution reduces the number of flora in wounds, it annihilates the natural defences of the serum. Its action appears to be simply the mechanical washing away of necrosed tissue. They agree with Wright that when this has been done a hypertonic solution of salt is the best application. This mention of salt solutions may not inaptly introduce a brief digression. Their uses and effect have been recognized and taught in American schools for some years. However useful they doubtless are, they are also far from being a novelty.

Recently, various English writers,—Browning, Gulbransen, and Thornton,—have studied the precise antiseptic strength of sodium hypochlorite. They contrast it with brilliant green, one of the group of specific antiseptics. Brilliant green is somewhat less active than acriflavine in the presence of serum, but solutions of 1:2000 were five hundred and seven times more powerful than Dakin's solution against staphylococcus and *B. coli* respectively (*British Medical Journal*, August 4, 1917). Acriflavine at present is considered one of the most effectual of specific antiseptics, and it has a remarkable selective germicidal effect on almost all organisms, causing their rapid disappearance from wounds. Moreover, the effect of these dyes is increased by the presence of serum, and they are regarded as superior to Dakin's solution when used according to Carrel's method.

A somewhat less important consideration is raised by the question how far the chemical faults of this solution militate against its use. In its preparation it is difficult, if not impossible, to avoid an excess of boric acid, which it is necessary to add in order to keep the solution free from caustic soda, which itself results from the presence of free hypochlorous acid. The effect in application of caustic soda is painful and sometimes irritating. In a later preparation,—p-toluene-sodium-sulphochloramide,—Dakin has endeavored to avoid this fault, but it is likely that by introducing a basic substance into his antiseptic he has lessened its effect in the presence of serum. Daufresne or Dufresne, as some spell it, avoids the use of boric acid, substituting carbonate and bicarbonate of sodium in the solution of chlorinated lime. In this case the liquid contains free caustic soda, which causes injury to the vitality of the tissues. Daufresne's solution requires twelve hours for its

preparation and great technical skill. According to a recent writer, E. G. Schlesinger, in the July issue of the *Journal of the Royal Naval Medical Service*, the Dakin-Daufresne solution "aims at securing a solution containing between 0.45 and 0.5% of hypochlorite and devoid of any free caustic soda." Tests of this solution made by Duret and described in the *Journal des Practiciens* do not bear out this belief. He suggests a change, that is, the action of magnesium sulphate on chlorinated lime. This solution, he states, is free from caustic alkali, is stable, and cytophylactic. In a sense this may be true, but practice and laboratory tests indicate that the class of substances which depend for their effect on hypochlorites is precisely the class which must be discounted.

Another property alleged to belong to Dakin's solution seems open to question. According to Schlesinger, it "has the valuable property of rapidly splitting protein into soluble substances." There is clearly no possible answer to this assertion, except a purely theoretical one, having no expression as a chemical formula. In such hypothetical reactions there will doubtless be many possibilities. On this point, A. C. Hollande in *Comptes rendus de l'Académie des Sciences*, 1916, elxii, p. 959, has brought forward some investigations that afford us at least an analogy. On adding basic dyestuffs to blood serum, a copious precipitate is produced, but if an acid dyestuff is used, coagulation of the albumin is prevented. It seems likely that definite compounds between the soluble protein and the dyestuff are formed. But as heat is necessary to this reaction, it becomes hard to understand how it can take place in wounds.

An invaluable insight into the methods of surgeons at the front is provided by the latest reports of the French and German authorities. An abstract of the present German practice, published in the *British Medical Journal*, shows that primary excision and suture is the accepted method of treating wounds. The French have lately emphasized the value of this method, which they say is founded upon the rational one of helping nature in her own methods of cure, which they call the autosterilization of wounds. Removal of the lacerated and necrosed tissue, washing with hypertonic saline, and suture, have yielded the best results. The practical lesson is that the treatment of wounds during transport and afterwards is a question of technic which,

if properly done at the right moment, leads to the happiest results without the routine use of antiseptics. And these, when used, are those which are specific against the special flora of the wound. But, with good technic, the flora should be excluded.

THE DRAFTING OF MEDICAL STUDENTS.

IN another column of the present issue of the *JOURNAL* is published a report by the Committee on Hospital and Medical Facilities of the New York Mayor's Committee on National Defense relative to the drafting of hospital internes and medical students. The desirability of such draft has for some weeks been a subject of discussion in medical organizations and periodicals. On August 21, the United States Secretary of War instructed Surgeon-General Gorgas to provide him with figures showing how the operations of the draft law would affect reputable medical schools throughout the country. In this work, Dr. Gorgas was assisted by Dr. William H. Welch and Dr. Victor C. Vaughn, who are special advisors on his staff.

The shortage of hospital internes has already begun to make itself felt. In twenty New York hospitals, 156 members of the staff have already joined the Medical Reserve Corps; and of 218 internes, 178 are of draft age, and 88 have already been accepted. Authorities on medical education in Baltimore, Syracuse, Cincinnati, St. Louis, Cleveland, and Boston have joined with the New York Mayor's Committee to urge the exemption of hospital internes and medical students from the general draft. A communication on this subject from Dr. Heffron of Syracuse to the Chairman of the Senate Committee on Military Affairs elicited the following reply:

"It seems to me that in the operation of this act some method will be devised by those who are responsible for its execution to utilize to the best advantage the services of those who may be drafted into the service under its terms. If this is not to be the case the whole system would be seriously impaired. Have you ascertained what the War Department proposes to do? Suggestions for changes of the law have not yet reached this committee, so far as I know, but it may be that the Secretary of War has already anticipated the situation you mention. The matter is having my careful attention."

In Chicago similar action against the drafting of medical students has been taken by leading

physicians and educators. Statistics show that without exemption the draft would involve the following percentage of students at several large institutions in medical training: Columbia University, 30%; Bellevue Hospital Medical College, 22%; Cornell University, 21%; New York Homeopathic Medical College, 33%; Syracuse University, 29%.

The arguments against the wholesale drafting of hospital internes and medical students for non-professional service in the National Army are obvious to those who regard the national economic value of the training which they possess. These arguments have been most effectively stated in a letter written by Dr. Henry A. Christian of Boston and published in the daily press on August 26:

"Should students of medicine be drafted as privates? This is a question which is receiving considerable discussion at present. Is this question of any vital importance to you as a citizen of Boston? Let us suppose that medical students will be drafted in the usual way. How would that affect Boston? In the first place such figures as are available indicate that a relatively large proportion of medical students have been called in the first draft. The provost marshal, General Crowder, says that not all of these will be drafted. However, this answer is of no real import. We are preparing now (at least we hope that this is the case) to continue drafts so long as soldiers are needed at the front. This being so, we must think not of the first call, but of the second and of the third, and so on until all physically fit young men, if needed, are called. We must plan, then, as if all physically fit medical students are to be drafted, for it would be neither logical nor fair to deal differently with successive calls to the draft."

"If half of the medical students of the country are called in the first and second draft, as reports received from about two-thirds of the medical students of America indicate, it is obvious that medical schools will be depleted and graduates in medicine will be decreased greatly in number unless something is done to prevent it."

"The medical students of today are the physicians of the future. As the students are reduced in number, so will the supply of physicians shrink. War demands many medical men. Seven to ten doctors per 1000 soldiers is stated as the requirement of our army. With an army in the field no fewer medical men are needed at home, for the soldier as the healthy young man in the community makes but little demand for medical service so long as he is a civilian. Hence the present would seem a poor time to reduce the supply of physicians."

"The medical student following graduation, spends one or two years as an interne or house

officer in the hospitals of the country. Boston's large hospitals must have house officers or close their doors. Already men for such positions are scarce, owing to the demands made by the war and navy departments for such men. If the supply is further reduced by drafting medical students, your hospitals must curtail their work and treat fewer patients in the near future. Furthermore, medical students, while still undergraduates, as part of their medical instruction, do much work in the Boston hospitals under the supervision of the house officers and their teachers on the visiting staff. To decrease by draft the number of medical students would hamper directly hospital work by decreasing the number of available student assistants, and this would be serious to Boston hospitals."

"The average citizens can have but little idea of the important part that medical students and recent graduates play in the daily work of Boston hospitals. If they did, there would go out to Washington an insistent demand that ways be found to maintain the number of medical students. Why should not drafted medical students be detailed to complete their medical studies and then be assigned for duty in army and navy or in civil hospitals, as the demands indicate? We are told that the surgeons-general of the army and navy lack the authority to do this. If so, should not the people demand that the Secretary of War or of the Navy, or the President or Congress, supply such authority at once?"

"It is not that the medical students have any desire to escape service. It is that they can better serve by completing their medical education. The country desires that provision be made for drafted medical students to complete their medical studies as expeditiously as possible because our armies and our civil population are going to need more and more doctors. Canada, England, France tell us that they made the mistake of depleting their medical schools in the beginning of the war. Can it be that the United States, in a short-sighted policy, is going to repeat this error?"

On August 31, however, the general apprehension on this subject was largely allayed by the news from Washington that President Wilson has issued an order providing that drafted hospital internes and medical students may enlist in the Reserve Corps and be assigned to remain in their positions at home to pursue their duties or studies for the general welfare of the country. The text of this order as forwarded by General Crowder to all state governors, is as follows:

"First—Hospital internes who are graduates of well-recognized medical schools or medical students in their fourth, third or second year in any well-recognized medical school, who have not been called by a local board, may enlist in

the enlisted Reserve Corps provided for by Section 55 of the National Defense Act, under regulations to be issued by the Surgeon-General, and if they are thereafter called by a local board they may be discharged on proper claim presented on the ground that they are in the military service of the United States.

"Second—A hospital interne who is a graduate of a well-recognized medical school or a medical student in his fourth, third or second year in any well-recognized medical school, who has been called by a local board and physically examined and accepted, and by or in behalf of whom no claim for exemption or discharge is pending, and who has not been ordered to military duty, may apply to the Surgeon-General of the army to be ordered to report at once to a local board for military duty and thus be inducted into the military service of the United States, immediately thereupon to be discharged from the national army for the purpose of enlisting in the enlisted Reserve Corps of the Medical Department.

"With every such request must be enclosed a copy of the order of the local board calling him to report for physical examination (Form 103), and affidavit evidence of the status of the applicant as a medical student or interne, and an engagement to enlist in the enlisted Reserve Corps of the Medical Department.

Upon receipt of such application with the named enclosures, the Surgeon-General will forward the case to the Adjutant-General with his recommendations. Thereupon the Adjutant-General may issue an order to such interne or medical student to report to his local board for military duty on a specified date, in person, or by mail or telegraph, as seems most desirable. This order may issue regardless of the person's order of liability for military service. From and after the date so specified, such person shall be in the military service of the United States. He shall not be sent by the local board to a mobilization camp, but shall remain awaiting the orders of the Adjutant-General of the army. The Adjutant-General may forthwith issue an order discharging such person from the military service for the convenience of the government.

"Three official copies of the discharge order should be sent at once by the Adjutant-General to the local board. Upon receipt of these orders the local board should enter the name of the man discharged on form 164A and forward form 164A, together with two of the certified copies of the order of discharge to the mobilization camp to which it furnishes men. The authorities at the mobilization camp will make the necessary entries to complete form 164A and will thereupon give the local board credit on its net quota for one drafted man."

This action by the President appears satisfactorily to solve for the present, at any rate, this doctor's dilemma in the best interest both of the public and of the profession.

THE CAUSES OF JUVENILE DELINQUENCY.

THE direct relation between delinquency and mental enfeeblement, disease or disorder, is no longer an open question. Indeed, the development of correctional reform—the treatment of the delinquent or other anti-social elements of society—is being carried on principally on this basis. The fact that the delinquent is unable to keep the pace in the general social struggle, and must choose these paths of least resistance, is in itself clear indication that he is in some manner below par. Examinations of various custodial institutions for delinquents has brought to light the fact that a very large proportion of them are feeble-minded or mentally disordered, beyond any doubt, and that a still greater proportion of them are below par physically. The delinquent class is continually being recruited from the ranks of the mentally retarded school child, whose condition is not recognized, or, if recognized, is not provided for. An intensive study of the mental condition of school children of certain communities carried out by the Public Health Service showed that over 9% of the school children examined were definitely retarded, and that of these 28% and over showed definite physical retardation (Public Health Reports, Nov. 17, 1916, and Bulletin No. 77). In many, physical defects and sensory disturbances, easily corrected, are the patent causes of much of the mental retardation. The mentally retarded school child is a positive handicap, and even a danger to the normal child, just as the delinquent is a handicap and a danger to the society in which he lives. In both instances segregation and appropriate training are the only rational treatment. The periodic mental, as well as physical, examination of the school child, and the attachment of trained psychiatrists to the general and, especially, the juvenile courts and custodial institutions, would furnish the material for segregation and training. The endeavors of Healy in the juvenile courts of Chicago have demonstrated the value of this sort of work.

And yet, while defective heredity—mental and physical defect—is so important a factor in delinquency, it is far from being the sole cause. Much of the delinquency of childhood, at least, is due to defective or vicious environment as well as the lack of proper parental or

communal supervision. It has recently been shown that juvenile delinquency has risen over 40% in London and over 65% in Munich since the war. This sudden rise cannot, of course, be due to any hereditary or personal change in the younger element, but must be due to the family and general social disorganization incident to war conditions. The proper development of the child during war is a vital problem in national conservation, since it is this younger element which must officiate largely in reconstruction. Every scheme for national preparedness must consider the care and training of the child during war stress. Whether the adverse effects of war—shock, injury, sacrifice, etc.—will have an adverse hereditary influence upon the succeeding generations, or whether there is to be a renaissance as a result of the sacrifices and hardships of war, remains to be seen.

SHOCK AT THE FRONT.

IN another column of this issue of the JOURNAL (page 326), is published the fourth of Dr. W. T. Porter's remarkably interesting and valuable series of papers on shock. The three previous papers, which have appeared in the JOURNAL during the past nine months, have dealt respectively with surgical shock as observed at the European battle-front; with fat embolism as a cause of shock; and with certain therapeutic measures which may be employed to counteract shock. Dr. Porter's theories of shock and its treatment, based on his original clinical observations and developed by the experimental method, are now being tested and elaborated in action. His peculiarly vivid and graphic descriptive style makes this fourth paper, from the literary as well as the scientific standpoint, one of the most notable and important medical contributions which the war has yet produced.

MEDICAL NOTES.

DIPHTHERIA IN NEWPORT.—The quarantine placed on the Naval Reserves' Camp and Fort Adams in Newport, was lifted on August 15, as no new cases had been reported there and the number of new cases in the city had begun to decrease rapidly. The disease did not make its appearance at the naval station and only a few light cases were reported at the harbor forts.

MEDICAL SOCIETY MEETING.—The Medical Society of the Missouri Valley will hold its thirtieth annual meeting in Lincoln, Neb., on Sep-

tember 20 and 21. Representatives of the Army, Navy, and Public Health Service will address the meeting on the general topic of "How Can the Medical Man Best Serve His Country?"

TUBERCULOSIS AS REVEALED BY DRAFT TESTS.—The National Association for the Study and Prevention of Tuberculosis is preparing to take up the care of the thousands of cases of tuberculosis brought to light by the examination of men who have been selected by draft and rejected for their disability. Dr. H. A. Pattison of Rockford, Ill., has been appointed a new medical field secretary to organize preventive work in military camps and to endeavor to get lists of men rejected on account of tuberculosis.

WAR NOTES.

MILITARY ORTHOPEDICS.—It is announced that Surgeon-General Gorgas has appointed Dr. Elliott G. Brackett of the Army Medical Reserve Corps to be director of a newly created Department of Military Orthopedics, which will have charge of the treatment of deformities in soldiers resulting from wounds. It is expected that a large per cent. of disabilities among troops will be cured or overcome because of this special treatment. The Department of Military Orthopedics in France will be in charge of Major Joel E. Goldthwait.

REPORT OF MAJOR GOLDTHWAIT.—The return of Major Joel E. Goldthwait from a tour of inspection of French and English orthopedic hospitals has brought to the organization of orthopedic work, both in this country and with the American troops abroad, the benefit of the experience of those countries in re-educating and restoring, either to military or to civil life, the crippled and deformed soldier. It is reckoned that orthopedic methods of treatment have restored 30% of the men in the allied countries, and in Canada the claim is a saving 70% of the wounded men. Major Goldthwait states that:

"A good many of the men shot through the body or the head die; those whose legs, feet or hands are injured are among the orthopedic cases. A great many of these would be crippled for life unless you did something for them by giving them this special orthopedic treatment that has been so wonderfully worked out.

"Just to show the results accomplished, I may mention that from one hospital, where there were 1350 men under treatment, 1000 of them were sent back into the army. In other words, this special form of treatment made that 1000 well enough to return to active service. And the same thing is happening to 70% of men injured in the Canadian armies."

The members of the unit which accompanied Major Goldthwait abroad are now in the British Isles, working in various hospitals studying English methods. The British War Office would welcome the services of more of these American orthopedic surgeons.

NEW YORK'S FIRST WAR HOSPITAL.—The National League for Women's Service has opened the first war hospital in New York for the care of the men training at a nearby military camp. The hospital occupies an old residence at Tarrytown, and will obviate the necessity of sending sick men to a hospital at Ossining, as formerly.

MEDICAL AID FOR REJECTED MEN.—The State Guard of Massachusetts has, through its medical department, put forward a plan to provide free medical attendance for men who have been rejected as recruits because of remediable physical defects. Governor McCall, following a conference at the State House, wrote officially to Major General Butler Ames, in command of the State Guard, requesting that the surgical staff of the State Guard offer its services to try to make these men qualified to pass the physical examination. The plan, which has the unqualified approval of Major General Ames, provides that men who have been rejected shall apply at the recruiting station, where their rejection is filed, and will be given a card stating the grounds of the rejection. On the presentation of this card to the State medical officer at the State House, the men will be directed to the surgeon or physician best fitted to handle each case. Among the physicians who have volunteered their services for this work are: Donald V. Baker, Brookline; Harold G. Giddings, Allston; Edward A. Supple, Boston; George W. Morse, Boston; Benjamin E. Sibley, Brookline; Russell F. Sheldon, Boston; Lemuel F. Woodward, Worcester; Charles E. Durant, Haverhill; Thomas B. Smith, Lowell; Ralph H. Seelye, Salem; P. Truesdale, Fall River; Hugh Williams, Garry De N. Hough, New Bedford; J. J. Egan and Franklin H. Thompson, Fitchburg; John W. Lewis, Thomas F. Harrington, George F. Hunt, O. C. Blair, D. S. Willeox, George L. Tobey, Kurt H. Thoma, Ralph D. Leonard, Robert C. Loring, P. Somers Smyth, W. Russell MacAusland, Boston; C. L. Overlander and Francis H. Slack, Brookline.

CARE OF FRENCH INFANTS.—The American Red Cross has sent a medical unit to France on behalf of French infants. The unit is financed by Mrs. William Lowell Putnam of Boston, and is made up of pediatricians. Dr. William P. Lucas of the University of California is in charge. Dr. J. Morris Slemmons of the Yale Medical School is a member of the unit. The work of the unit will be confined to parental hygiene and the scientific feeding and care of French babies.

MILITARY HOSPITALS.—The thirty-two new hospitals which are being built by the medical corps of the army for the care of the National Guard and National Army camps will cost about \$14,500,000. The aim of the medical department is to have hospital provision for 5% of the enlisted force by fall, and then extend it to

10%. Abroad, facilities for 20% of the American expeditionary forces will be available. Provision will be made at the cantonments in this country for 3% of the troops in each camp. It is a well-known fact that the percentage of sickness among men under military discipline is very much less than in civil life, even though the sick list of a military camp includes cases which in civil life would not be regarded as at all serious.

At the cantonments in this country, hospitals will be built capable of caring for 3% of the troops in each camp. Each hospital with the space reserved for extensions will require sixty acres. The buildings will be 24 feet wide, the length varying to meet the needs. A ward about 157 feet long will accommodate 32 beds. A cantonment hospital on a basis of 1000 beds will include about 70 buildings, if each ward is considered as a building. Adequate laboratory facilities will also be provided, and plans are being made to appoint permanently to the staffs of the hospitals, men especially trained to do laboratory work in order that careful tests may be made of each and every soldier for tuberculosis, intestinal infections, and all other infectious diseases.

WAR RELIEF FUNDS.—On Sept. 1, the totals of the principal New England war relief funds reached the following amounts:

French Wounded Fund.....	\$246,648.87
Armenian Fund	223,959.47
Children's Fund	214,116.00
Surgical Dressings Fund	122,296.50
Polish Fund	81,476.95
Italian Fund	44,132.72
French Blind Fund	3,467.00
War Dogs' Fund	1,100.75

BOSTON AND MASSACHUSETTS.

WEEK'S DEATH RATE IN BOSTON.—The total number of deaths reported during the week ending August 25, 1917, is 194, against 238 the corresponding week last year, making a death rate of 13.10. Non-resident deaths, 36.

The total number of cases of communicable diseases reported is as follows: diphtheria, 61; scarlet fever, 7; typhoid fever, 9; measles, 31; tuberculosis, 52. Included in these totals are the following non-residents: diphtheria, 8; scarlet fever, 4; typhoid fever, 2; tuberculosis, 3.

The total number of deaths from communicable diseases is as follows: diphtheria, 5; measles, 4; tuberculosis, 22. Included in these are the following non-residents: measles, 1; tuberculosis, 3.

TYPHOID FEVER IN GARDNER, MASS.—On August 20 and 21 twenty-two cases of typhoid fever were reported in the town of Gardner. The health authorities direct their suspicions to a contaminated milk supply. Most of the cases are confined to one section of the town.

RENOVATION OF HOSPITAL.—The Massachusetts Women's Hospital, Roxbury, has closed for a short time in order to make extensive alterations in the interior of the hospital. A new operating room will be built and equipped, an elevator installed, and a ward of six beds will be added. When the hospital opens, about September 15, a new administrative force has been appointed to take charge.

FRAMINGHAM HEALTH STATION.—The experimental community health station at Framingham, Mass., has maintained through the summer a camp for children under sized and under weight, and will continue the camp into September. It will admit mothers and younger children. In the past it has admitted only boys and girls between five and twelve years of age. Dr. Donald B. Armstrong, the executive officer of the health station, is urging the school committee to establish a dental, nose and throat and eye clinic for school children.

SOCIAL SERVICE ESTABLISHED AT CITY HOSPITAL.—The social service department of the Boston City Hospital, organized and supported for two years and a half by a committee of interested women, has at last succeeded in demonstrating its usefulness to the institution to a degree warranting its being included as a recognized department of the hospital and of being supported by the City. A small sum of money, which will pay the salaries of five of the eleven workers of the department, has been appropriated, and on the strength of this assistance the committee is planning to raise funds sufficient to carry on the work to a greater extent than has before been attempted. The small force last year, under the leadership of Miss Gertrude L. Farmer, cared for 1462 patients and made 2588 visits.

In view of what has already been accomplished, and of what must of necessity be undertaken, the committee is confident of the continued financial support, not only of its friends, but of the citizens of Boston. Mrs. Paul Thorndike is chairman of the group of women who organized the work. The other members of the committee are: Mrs. Henry Andrews, Mrs. E. H. Bradford, Mrs. Carlo Buonamici, Mrs. H. L. Burrell, Mrs. C. A. Coolidge, Mrs. Harvey Cushing, Mrs. Thomas M. Devlin, Mrs. Henry Ehrlich, Mrs. Reid Hunt, Mrs. Colin W. McDonald, Mrs. G. H. Monks, Miss Mary Morton, Mrs. I. A. Ratschesky, Mrs. Milton J. Rosenau, and Mrs. E. R. Young.

HOSPITAL BEQUESTS.—By the will of the late Ellen F. Ferguson of Brookline, the Addison Gilbert Hospital of Gloucester will receive a fund of \$5000, upon the death of a beneficiary, to be used for free beds.

By the will of the late Judge John C. Kennedy of Newton the sum of \$3000 has been left to the Newton Hospital.

POLIOMYELITIS IN HAVERHILL, MASS.—On August 14 the total number of cases of infantile paralysis reported in Haverhill had reached twenty-five.

The Massachusetts Medical Society.

NOTES FROM THE DISTRICT SOCIETIES.

DISTRICT CORRESPONDENTS.

Berkshire, A. P. MERRILL, M.D., Pittsfield.
Bristol North, ARTHUR R. CRANDELL, M.D., Taunton.
Bristol South, EDWIN D. GARNER, M.D., New Bedford.
Essex North, T. N. STONE, M.D., Haverhill.
Essex South, H. P. BENNETT, M.D., Lynn.
Hampden, LAWRENCE D. CHAPIN, M.D., Springfield.
Hampshire, E. E. THOMAS, M.D., Northampton.

ESSEX SOUTH DISTRICT MEDICAL SOCIETY.—Dr. P. P. Johnson, of Beverly, Captain in the M. R. C., is at Fort Benjamin Harrison.

Dr. H. E. Sears of Beverly, Captain in the M. R. C., is at Fort Ethan Allen.

Dr. W. G. Stickney of Beverly, Lieutenant in the M. R. C., has been ordered to Camp Devens at Ayer.

RALPH E. STONE, M.D., Reporter.

Obituaries.

FOUR EMINENT EUROPEAN MEN OF SCIENCE.

THERE have died within the past year in Europe four eminent men of science, natives of England, of Germany, and of Bohemia, whose loss to the scientific world is perhaps even greater than any other which has befallen it as a result of the present war. Though the fields of their activity were diverse, their lives, devoted to medical pursuits, have borne a certain underlying resemblance, and their death within a short period of time makes it appropriate that they should be considered in a common obituary notice.

SIR VICTOR HORSLEY, M.B., B.S., F.R.C.S., F.R.S.

SIR VICTOR HORSLEY, a celebrated British surgeon, best known for his work on brain surgery, died of sunstroke in Mesopotamia on July 16, 1916, while serving there as consulting surgeon to the British Expeditionary Forces.

Victor Alexander Haven Horsley was born at Kensington, London, in 1857, the son of an artist. After a course of brilliant scholarship

at the University College Hospital, London, he received the degrees of M.B. and B.S. in 1881, with a university scholarship and gold medal in surgery. In 1883 he became a fellow of the Royal College of Surgeons of England, and in 1884 superintendent of the Brown Institution, where he began an elaborate series of experiments on myxedema, which led to the demonstration of the nature of this disease as a phenomenon of thyroid deficiency. In 1885 he was appointed assistant surgeon to the University College Hospital, in 1886 surgeon to the National Hospital for Paralysis and Epilepsy, and in 1893 full surgeon to the University College Hospital and professor of pathology at University College. In 1902 he received the honor of knighthood; in 1906 he retired as emeritus professor of clinical surgery and consulting surgeon to the University College Hospital. In 1911 he received the first award of the Lannelongue International Prize in Surgery. He had also received the honorary degree of M.D. from the University of Halle, Germany.

From the beginning of his professional career, Horsley's interest was primarily in the physiology, pathology and surgery of the nervous system, and his early exploits in cranial surgery established that field as a specialty. He was an extensive writer on all aspects of his chosen line of work, and at the same time he carried on the busy life of a surgical practitioner and laboratory investigator. He was one of the pioneers in cerebral localization, and demonstrated the similarity of cortical areas in the rhesus monkey and in man. He investigated the upper conduction lines in the spinal cord. He explored the region of the thalamus and the subject of cerebellar function as studied by electrical stimulation. He was an ardent defender of the legitimacy of animal experimentation, and his unquestioned integrity and highmindedness were of the greatest value in the defense of medical science against its assailants in England. Horsley was also a pioneer in surgery, and his early exploits in the operative cure of intracranial tumors placed him immediately in the foremost rank of his profession. His eager and ardent personality and his natural adroitness at finesse made him particularly fitted for swift and successful surgery of the most delicate type.

At the outbreak of the European War in 1914, Sir Victor Horsley volunteered his professional services to his country, and after holding various administrative posts in England, was sent early in 1916, to Egypt and later to Mesopotamia. The story of the last months of his life under the arduous conditions of service to which he was there subjected, are well told in obituary notices which have appeared of him in the *Lancet*, and formed a fitting chapter of conclusion to his life of brilliant and distinguished service. A fellow officer, who served with Sir Victor in Egypt during the last phases of his strenuous career, writes of him in part as follows:

"Soon after his arrival in Egypt he was given an appointment more in keeping with his professional position and was made consulting surgeon to the Forces. Before this, however, he had done an immense amount of valuable work in assisting to organize the surgical side of the base hospital to which he was originally attached. As a consulting surgeon he did splendid work; he devoted with unsparing zeal both time and energy to finding out and correcting, as far as lay in his power, any defects of equipment or mistakes in organization in the hospitals, and in the early days in Egypt there were many of these. He was always ready to help with his advice and example those of us who asked him to do so, and in the midst of the most trying circumstances he never lost his cheeriness or good temper. In spite of all the calls upon him, he found time to carry out some original work in connection with the infection of head wounds, and it was entirely owing to his teaching and example that the results of the operative treatment of these injuries, at any rate in one of the hospitals, were so extremely good. His energy and devotion to his work were the more striking because it was obvious that the atmosphere of a military hospital was not very congenial to him, and when we remember his force of character and independence this is not to be wondered at. The amount of work he got through in Egypt undoubtedly tried his strength, and he could not be persuaded to rest to the extent that was really necessary, especially in the hot weather. A tour of inspection which he paid to the Peninsula did him good in this respect, but the many muddles and deficiencies which he found there must have had a depressing effect upon his spirits. He volunteered for duty in Mesopotamia without any thought for himself, and I am sure that he went there in the hope that he might be able to do something to remedy the defects in the medical arrangements which are now so notorious. If he expended, as I am sure he did, all his strength and energy on this work, it is little wonder that he should have succumbed to the effects of that most trying climate. Victor Horsley's was a most charming personality and he was a great favorite in our mess. His death leaves a blank in the branch of surgery, which his genius had played so large a part in founding, that at the present there is no one fitted to fill."

Another letter from a physician at Amara tells as follows of the more immediate circumstances of Sir Victor's death:

"I have just been to the Rawal Pindi Hospital, where Sir Victor Horsley was lying ill, to find that he passed away a few minutes ago—at 8.45 p.m.

He had only three days ago returned to Amara from the front and seemed to be in his usual health and spirits. Only yesterday (Saturday morning) I had some conversation with him on a subject which was interesting him—the provision of hospitals with laboratories; and he

then set out to walk back to his camp, which was about a mile and a half away across the Tigris bridge and over the open plain. The shade temperature was over 110° and the atmosphere humid. When he got to his tent he heard there was a sick officer he knew, about half a mile further on; he went on to see him and examined him carefully. He complained of headache later in the afternoon and was admitted to the Rawal Pindi Hospital on Saturday evening, about seven o'clock. His temperature rose, he had a rather restless night, and in the morning seemed worse. His temperature rose all day and finally reached nearly 110° F. He became comatose in the afternoon and passed away after little more than twenty-four hours' illness. The cause of death appeared to be heat-stroke, a condition which carries off many people nowadays in Mesopotamia.

The news of his death has been received with the greatest sorrow and regret, even in these days, when the loss of friends is almost our daily portion, and it will be a large and representative following he will have to his last resting place tomorrow in the Amara Cemetery.

It would ill become one who has only known him personally within the last few months to write of his many and great achievements in the past, but I can speak of his untiring energy and the loyal devotion and singleness of purpose shown in his every action up to but a few hours ago. Those who have met him recently are aware that he had framed a very severe indictment against those he believed were responsible for the mismanagement which he thought characterized some aspects of the campaign. It is only three days since he returned from the front, and he was about to return to India for a spell to prepare his report.

He has been urged time and time again to curb his extraordinary energy and not to put too severe a strain on his physical capacity, but it appears that he underestimated the baneful effects of the severe climatic conditions existing just now in Mesopotamia. It would have been easy for him to have pleaded the heat or his increasing years, but he refused to take things easily, and has sacrificed himself to his zeal for bettering the conditions of others."

In personal appearance and manner of speech, Sir Victor Horsley bore a striking resemblance to Professor George Herbert Palmer. In 1913, as president of the Surgical Section of the International Medical Congress at London he became known to many of the younger American surgeons who had not previously had the privilege of his acquaintance. His courtesy as a presiding officer, his unflinching consideration of others, his swiftness and keenness of mental perception, his unerring instinct for truth, impressed all who saw or met him as manifestations of a character that represented the finest type of professional and personal quality. Sir Victor Horsley is survived by his widow, one daughter and two sons.

SIR THOMAS LAUDER BRUNTON, Bt., M.D., C.M., D.Sc., LL.D., F.R.C.P., F.R.S.

DR. SIR THOMAS LAUDER BRUNTON, who died on September 16, 1916, in London, was born at Bowdoin, Roxburghshire, Scotland, on March 14, 1844. After a brilliant undergraduate career at Edinburgh, he obtained the degrees of M.D., and C.M. from that University in 1866, that of B.Sc. in 1867, that of M.D. in 1868, and that of D.Sc. in 1870. After serving as house physician at the Edinburgh Royal Infirmary, he studied abroad at Vienna, Berlin, Leipzig and Amsterdam. Finally settling in London, he became a member of the Royal College of Physicians, and in 1874 was elected to the Royal Society in recognition of his work on the physiology of digestion and secretion, on the chemical composition of the blood, and on the action of digitalis and mercury. In 1870, Brunton was appointed lecturer on materia medica and pharmacology, and in 1875 was appointed assistant physician to St. Bartholomew's Hospital. During the succeeding years at this institution he pursued the brilliant course of clinical and scientific research, whose results are recorded in his numerous publications. In 1885 appeared his well-known handbook of pharmacology, materia medica and therapeutics, and in 1886 a volume on disorders of digestion. He delivered many lectures before the Royal College of Physicians, and in 1894 was its Harveian orator. In 1897 Dr. Brunton became full physician at St. Bartholomew's Hospital and consulting physician in 1904. He received the honor of knighthood in 1900, and was made a baronet in 1909, and received the honorary degree of LL.D. from the Universities of Aberdeen and of Edinburgh. He was a member of many British medical and scientific societies, a foreign honorary member of the American Academy of Arts and Sciences, correspondent of the Philadelphia Academy of Medical Science, associate fellow of the Philadelphia College of Physicians, corresponding member of the Therapeutical Society of Paris and honorary member of the American Therapeutic Society and of the Imperial Military Academy of Petrograd. He is survived by two daughters and one son, who succeeds to his title, his second son having been killed in the war.

Of Brunton's work as a teacher, his obituary notice in the *Lancet* speaks as follows:

"As a lecturer he met with complete and well-deserved success, both at his medical school and on more public or official occasions. It will be observed that his best books were the outcome of collected lectures, and those that are not so, where they are not merely popular disquisitions, conformed to the lecture style. He was always able to make his subject interesting and easy to follow, and yet he was very thorough, while he would illustrate his points, whether simple or complex, by example, experiment, or anecdote. Punctuality with him was a watchword, and si-

multaneously with the hand of the clock pointing to the lecture hour the figure of Brunton appeared at the door of the theatre, and almost before he had arrived at the demonstration table he had completed a rapid summary of the previous lecture, so that his audience might be able to follow his thread."

Of his extra-professional character, this obituary further speaks as follows:

"Outside his purely professional work, the outstanding features of Brunton's life were his great generosity and his practical sympathy with pain. The congenial kindly manner which endeared him greatly to his patients was a true indication of his almost emotional feeling for the suffering of others. No one more bounteous with his time, thought, or money, whether to individual friends or for the public good, ever adorned the medical profession. All schemes in favor of national health, of school hygiene, or of military training had in him a stalwart advocate, and in this last connection his close familiarity with the continent and the German professional world long ago led him to believe, and to say, that war between England and Germany was inevitable."

PROFESSOR ALBERT NEISSER, M.D.

DR. ALBERT NEISSER, who died on July 30, 1916, at Breslau, Germany, was born near that city in 1855, the son of a distinguished physician, Dr. Moritz Neisser. He studied medicine at the Universities of Breslau and Erlangen and received the degree of M.D. in 1877 for a thesis on echinococcus disease. He immediately became attached to the Breslau University Hospital and Polyclinic for Syphilis and Diseases of the Skin, as assistant to Dr. Oskar Simon. It was here, in 1879, that he made his most famous discovery of the diplococcus which has since borne his name. Upon Simon's death in 1882, Neisser was promoted to his professorship, which he retained until his death. Though his name is chiefly associated with the gonococcus, he made notable researches in other fields, especially in dermatology, bacteriology, serology, and syphilography. In 1902 he founded the Deutsche Gesellschaft zur Bekämpfung der Geschlechtskrankheiten. In 1905 he spent several months on an expedition in Java to study the phenomena of syphilis inoculated in monkeys. It was on the basis of his researches that the details of Wassermann's reaction were developed. Dr. Neisser also traveled in Norway and Spain to study leprosy. It was during his absence from Germany that the *spirocheta pallida* was discovered by Schaudinn and Hoffmann, whose observations were communicated to Neisser in Java and speedily confirmed by him. Dr. Neisser was a brilliant investigator and teacher, and his death, from diabetes complicated by nephrolithiasis, removes one of the most famous and familiar of the older generation of German scientists.

VINCENZ CZERNY, M.D.

DR. VINCENZ CZERNY, who died last November, was born in Bohemia in 1842, the son of a pharmacist. He early evinced a fondness for natural history and was sent to the University of Prague and educated as a biologist. In 1867 he was appointed surgical assistant to Billroth, and gradually relinquished his histologic laboratory pursuits for those of clinical surgery. In 1871 he was appointed professor of surgery at Freiburg, and in 1877 was translated thence to the surgical chair at Heidelberg, where he remained until his death. He was president of the German Surgical Society in 1901, of the International Surgical Society in 1908, and in 1910 became honorary president of the International Society for the Study of Cancer. He was the founder of the Cancer Institute at Heidelberg. In its editorial obituary of him, the *Lancet* speaks as follows of his contributions to medical literature, of his personal character, and of his service as a teacher:

"Possessed of a ready pen and incisive style, and the author of 150 or more short practical papers, Czerny never wrote a systematic treatise, and his name, although associated with the first vaginal extirpation of the uterus and with cancer research in general, is known only to the specialist in connection with numberless improvements in operative methods. His intestinal suture is, of course, in every student's text-book. As a teacher, Czerny fully recognized the value of *können* over *wissen*, and worked for the revision of the German medical curriculum on practical lines. In so doing he held up English and American methods as worthy of imitation, as well as the effect of our General Medical Council in standardizing medical education. In his intimate association with his staff and hospital patients Czerny showed a warm human sympathy which will make his loss acutely felt and his place hard to fill."

Miscellany.

THE DRAFTING OF MEDICAL STUDENTS.

UNLESS the War Department speedily announces a program for such disposition of drafted hospital internes and medical students as will meet the needs of the army and of the civil population, an appeal will be made to Congress for appropriate legislation. The urgency of the situation has again been brought to the notice of President Wilson and Secretary Baker, and it is hoped that an executive order to relieve the situation will be issued within the next forty-eight hours. Longer than this, the medical educational authorities and the numerous civic bodies which have been demanding action are not likely to wait.

The Mayor's Committee on Hospital and Medical Facilities has been in communication with members of the Committees on Military Affairs of both the Senate and House of Representatives, and has assurances that the situation is understood by the members of those committees.

The Medical Section of the New York State Branch of the Council of National Defense was notified on Monday afternoon that "the military authorities have asked for a definite statement of the number of third- and fourth-year medical students who have been actually accepted for service, and though no promise has been given, there is reason for hope that these men may be allowed to continue their studies. The General Committee has not altered its views as to the desirability of having all medical students continue their technical training.

The contention of the Provost Marshal General that the draft would not make serious inroads on the medical schools, is refuted by returns received directly from twenty medical colleges. The following figures, showing the proportion of medical students drafted and accepted under the first call, were given out yesterday afternoon by Dr. S. S. Goldwater, chairman of the Mayor's Committee on Hospital and Medical Facilities:

University of Nebraska	34%
University of Cincinnati	32%
Western Reserve University	31%
Atlanta Medical College	17%
Hahnemann Medical College, Chicago	22%
University of Wisconsin	20%
Columbia University	30%
University and Bellevue Hospital Medical College	22%
Cornell University	21%
University of Virginia	9%
New York Homeopathic Medical College	33%
Syracuse University	29%
Medical College of South Carolina	18%
University of Michigan	23%
Jefferson Medical College	22%
Marquette University	20%

In some instances these figures refer to the graduating class only; in other instances they include the total student body. This information will be presented to Secretary Baker immediately, and may be used as the basis for immediate action. Mr. Frederick P. Keppel, Assistant to the Secretary of War, has telegraphed to Dr. Samuel W. Lambert, Dean of the College of Physicians and Surgeons, that "Secretary Baker is still awaiting definite figures as to amount actually drawn and accepted for service from medical schools. If you can expedite these figures it will be of great help. As soon as they are at hand Secretary Baker will take the question up with the President."

H. P. Davison, Chairman of the War Council of the American Red Cross, is interested in the maintenance of the hospital resources of the country, and has requested the Mayor's Com-

mittee on Hospital and Medical Facilities to furnish full information.

Dr. Walter B. James, President of the New York Academy of Medicine, in a letter to President Wilson, says, "I believe that in any case, and in spite of every precaution the army will suffer bitterly from the lack of adequately prepared medical men of the proper age, and that the civilian population will suffer, and indeed, is beginning to suffer already from the same cause. A number of agencies have already resulted in cutting down the number of students in the medical schools, and I believe that the present policy of drafting medical students into the army will inevitably result in disaster, both to the army itself and to the civilian population."

Mother M. Catherine Herbert, Superintendent of the Mary Immaculate Hospital, Jamaica, Long Island, writes, "I must state how we are situated in regard to internes. The doctors who had finished their term of internship have applied to be taken on the service of the United States Government. We were fortunate enough to have three men who were ready to go on duty after graduation on June 1, 1917, but are sadly disappointed to learn that they were called to military duty. We have made every reasonable effort, but cannot get one graduate to take their places. If the importance of having service at the hospital crippled is considered, I am sure you will do everything in your power to avoid this."

Dr. Ralph B. Seem thus describes the crippling of the service of Johns Hopkins Hospital at Baltimore: "Last Spring we were requested by the Council of National Defense to furnish a list of the members of the medical staff, stating those who could be spared for military service and those who were needed in order to carry on the work of the hospital. Among those needed at home were included the names of the internes for the coming year. Some of these men have been drafted. When it was learned that they could not be exempted the matter was taken up with Major Noble, who advised the internes to join the Medical Corps immediately in order to prevent the men from being drafted as common soldiers. At the same time it was stated that it might be possible to make arrangements with the Surgeon-General to detail these men for duty in their own hospitals. We are now told that it is not possible to make any such arrangements. As a result we shall be greatly crippled in carrying on the work of the hospital in the coming year. There must be many hospitals throughout the country in the same predicament. This is particularly true in regard to the teaching institutions which have a double duty to perform."

The Philadelphia Hospital Association has organized for the protection of the interests of the hospitals of that city.

Dr. William B. Walsh, Secretary of the American Hospital Association, announces that

the trustees of that Association have decided to send a delegation of its officers to Washington to make a personal appeal to the Secretary of War.

Dr. C. R. Bardeen, Dean of the Medical School of the University of Wisconsin, writes: "I am convinced that Congressional action is the only thing that will save the situation. I feel safe in assuring you that if such action is proposed it will receive strong support from all of the Wisconsin men in Congress."

Figures received from Chicago show that of 177 internes in the five leading hospitals in Chicago, forty-three have been called and accepted by the local draft boards; in addition twenty-eight have been drafted from eligible lists of sixty from which the Cook County Hospital was prepared to draw to fill its shortage. Thus of a total of one hundred and seventy-seven internes, seventy-one, or 41%, have been drafted.

MANDATORY ESTABLISHMENT OF COUNTY HOSPITALS IN NEW YORK FOR TUBERCULOSIS.

PASSED as a war measure, so that the state will be prepared to treat all cases of tuberculosis discovered in examining men drafted for the army or who are found in the army itself, an amendment to the County Tuberculosis Hospital Law was enacted at the recent session of the New York State Legislature providing as follows:

"Establishment of county hospital for tuberculosis. The Board of Supervisors of every county in the state containing a population of thirty-five thousand or more, as determined by the latest state census, shall establish, as hereinafter provided, a county hospital for the care and treatment of persons suffering from the disease known as tuberculosis, unless there already exists in such county a hospital or institution provided by the county or other authority and caring for persons suffering from tuberculosis, which is approved by the state commissioner of health. Such county hospital shall be available for patients on or before the first day of July, 1918. If the board of supervisors of any such county shall have failed to secure a site for a county tuberculosis hospital, and to have awarded contracts for the erection of suitable buildings thereon by the first day of January, 1918, it shall be the duty of the state commissioner of health forthwith to proceed to locate, construct, and place in operation a tuberculosis hospital in and for such county, the capacity of which shall not exceed the average number of deaths per annum from tuberculosis in such county during the past five years. For such purposes the state commissioner of health shall possess, and it shall be his duty to exercise all the powers which would have been possessed by the board of supervisors of such county, had

such hospital been established and placed in operation by the board of supervisors thereof. All expenditures incurred by the state commissioner of health for and in connection with the location, construction and operation of such hospital shall be a charge upon the county, and provision shall be made for the payment therefor by the board of supervisors of such county in the same manner as in the case of other charges against the county. At any time after such hospital has been in operation, the board of supervisors in such county may appoint a board of managers for such hospital pursuant to the provisions of this act, and thirty days after the appointment of such board of managers by such board of supervisors, such hospital shall be transferred to such board of managers, and such board of managers shall thereafter possess and exercise all the powers of the board of managers of a county hospital for tuberculosis under this act, and the state commissioner of health shall be relieved from any responsibility therefor, except such responsibility as he exercises in regard to all county tuberculosis hospitals under the provisions of this act."

The new law affects twenty counties, eight of which have previously taken various steps leading to the erection of a hospital, but had not yet let contracts.

The State Charities Aid Association has issued a pamphlet entitled "A Compilation of the Laws of the State of New York Relative to County Tuberculosis Hospitals as of June 1, 1917." A copy may be secured from the Association upon request addressed to 105 East 22d Street, New York City.

PERIODICAL EXAMINATION OF HEALTH DEPARTMENT EMPLOYEES.

THERE is no phase of public health work which transcends in value the periodical medical examination. With the great and rapidly growing interest in public health questions this medical attention and medical supervision of employees is becoming an accepted procedure—a matter of course. For the past two years every employee of the New York Department of Health has been obliged to meet this requirement of an annual medical examination, in addition to the one received on entrance to the Department service.

With the older employees, this periodical test is optional, but as the antagonism first manifested toward this innovation has largely disappeared, the majority of both sexes have been examined and some, more enlightened than the others, have requested an examination at short intervals, where the findings have disclosed conditions not entirely satisfactory to the individual.

Up to June 29, 1916, 2104 employees had been examined, but in order to retain a convenient starting-point for future investigations, only

the first 2000 were included in the statistical records. Of the number mentioned, 1325 were women and 779 were men.

During the past year nearly 1000 re-examinations have been made, and of these 194 are men and 737 are women. Each case record receives a number, for no names are allowed to appear on the card, and the records, when completed at the end of the day's work, are placed in a special cabinet and kept under lock and key in the office of the Deputy Commissioner. Male employees are examined by a male physician, and female employees by a female physician. The physical record is not allowed to influence in any way the efficiency rating of the employee.

THE FINDINGS.

Of very great importance is the fact that 22.8 per cent. of those examined showed an albuminuria of greater or less degree. The tests applied were those in ordinary use for this purpose. The results therefore indicate an abnormality, a weakness or susceptibility which, if neglected, may be followed by chronic organic lesions and probably a shortening of life.

As many as 2.5 per cent. showed albuminuria combined with high blood pressure, and five cases of unexpected glycosuria were discovered.

Uncorrected defects of vision were found in 15.1 per cent. of cases and 17.71 per cent. showed abnormality in hearing.

Acute or chronic pharyngitis and hypertrophied tonsils were present in 29.3 per cent. and impairment of nasal breathing, due to some form of rhinitis or to deflected septum, existed in 17.2 per cent. of those examined.

Many of those suffering from such conditions were in urgent need of treatment, but had grown accustomed to their discomfort; they were, nevertheless, grateful for advice and willing to secure the necessary attention.

The number of organic heart lesions differed little between the sexes, though most medical examiners find the male sex suffering more frequently than the female from cardiac disease. Our figures were 8.8 per cent. for men and 6.7 per cent. for women. In the vast majority of instances the patients were not aware of any existing abnormality in the heart.

Pulmonary lesions existed in proportionately the same numbers, i.e., about 8.7 per cent. and 5.5 per cent. for women. Some of these were very slight, others of more importance. Scarcely a dozen cases were serious enough to require prolonged absence from duty and medical care. When such cases were found, leave of absence was granted without question, but medical supervision during absence was insisted upon in order that the patient should receive the requisite care. Where the pulmonary abnormality is slight, the patient receives medical counsel and is advised to remain under the care of a physician until well.

It is interesting to notice that the number of men who had acquired an excessive airoidupois is almost as great as the number of women similarly afflicted. In spite of the fact that women consume actually and relatively one-fifth less solid food than men, they attain adiposity much more readily, so that under ordinary conditions we expect a larger number of them to be overweight. The excessive weights were 18.9 per cent. of the men examined, and 21.2 per cent. of the women. As pronounced overweight has a marked effect in decreasing the length of life, those who show a tendency towards obesity receive careful warning and advice as to their habits and the regulation of their daily life. Re-examinations have shown an improvement in a number of such instances.

A relatively large number of women were much below the average weight, namely, 18.9 per cent. of those examined, but only 4.4 per cent. of the men were underweight.

The variations in blood pressure were considerable. As many as 11.4 per cent. of men exhibited high blood pressure (150 mm. Hg. or over), but several were far above this figure. Only 4 per cent. of the women showed pressure considerably above normal, but a large number of women—17.7 per cent. of women—manifested a very low pressure, that is, 108 mm. Hg. or below. Of these many were no higher than 100 mm. Hg. and several were even below this low figure.

Overweight and hypertension co-existed in 46 men and in 27 women; underweight and high blood pressure were found in five women and in one man; low weight and low blood pressure in one man and in thirty women.

In only a few cases could the high blood pressure be ascribed to aortic incompetence. It appeared to depend in most instances on other and widely varying causes. The large number of hypotension cases, especially among women, showed that many employees were suffering from a depressed vitality, and of these a considerable number presented a permanently low pressure. Forty-four women were markedly anaemic; only 19 men suffered in a similar way.

Nearly twice as many women as men complained of indigestion—7.5 per cent. women and 4.1 per cent. men—yet, strange to say, indigestion and constipation co-existed in a surprisingly small number,—only 6 per cent.—and, though more women suffered from indigestion than men, their teeth were cleaner and otherwise in better condition. A certain number of both sexes were constipated—8.8 men and 17.5 women. Nearly 24 per cent. of those examined showed defective teeth, and 4.9 per cent. of this number were women. Notwithstanding, more women suffered from pyorrhoæa alveolaris—about 1.2 per cent.—and scarcely half as many men.

The examinations disclosed more men than women suffering from hernia, from tenderness

over the gall-bladder and spleen, and from enlarged liver. Sixteen cases of hernia were found among men; only five among women. Twenty-five men suffered from tender gall-bladder, and there were six cases of palpable spleen found and three of palpable liver. About one per cent. suffered from varicocele.

Women showed more nervous symptoms than men, suffered more from gastropsis, gastric ulcer, hypertrophied thyroid, insomnia and from varicose veins and weak and flattened arches. Thirty-three women showed marked varicose veins, fifty had weak, painful or flattened arches. Two men had flat or painful arches and four showed varicose veins.

Exaggerated knee jerks were very common in women—as many as 137 showed this symptom—often combined with a fine tremor of the hands. About a half dozen men showed exaggerated reflexes, but in one the knee jerks were absent. Tremor was a symptom not often shown by the male employees, but two had coarse tremor of the hands.

Twice as many women as men complained of headache. Three men showed defects of speech and one woman.

Dr. Charles Dana says men suffer more from insomnia than women, yet 1.9 per cent. of men complained of sleeplessness in contrast to 2.7 per cent. of women who did so.

Abdominal tenderness, especially in the region of the appendix, was found on palpation in six men and in eight women. Movable kidney was found in two men and seven women. No man showed symptoms of gastric ulcer though four women did so. Twelve women presented symptoms of gastropsis; no man was found suffering in this way.

Hypertrophied thyroid glands were found in 51 women and in two men. Women of European birth were more often affected with goitre than the native American women.

The unclassified impairments numbered 64 and included some skin lesions and other departures from the normal rather difficult to classify.

The menstrual history of women showed an extraordinary improvement over the conditions obtaining a few years ago, only 12 per cent. instead of the formerly recorded 50 per cent. and 75 per cent. giving a history of periodical disability. It is interesting to notice that slightly over three per cent. suffered only after unusual fatigue, overwork or on exposure to wet and cold.

Three women, two of them nurses, had never been vaccinated; one of these had had an attack of smallpox and supposed herself immune; all were, of course, vaccinated and successfully.

A comparatively small number of employees had been vaccinated against typhoid; of these 35 were nurses, 15 physicians, 15 laboratory workers and 16 others.

On re-examination about 10 per cent. of the

persons examined showed very decided improvement over their former physical condition; some had gained in weight; some, after much effort, had lost weight; certain impairments had received treatment with resulting gain to the patient. Many, when originally examined, had shown no abnormality so that but little change was to be expected.

Every employee, when absent from duty on account of illness, should be re-examined on return to duty. If absences are frequent a re-examination should be made every three months, with a view to determining the cause of disability. Those who are below normal when first examined should be examined in six months' time.

Any employee desiring special medical advice should be made to feel that this is gladly given—that the object of the welfare division is to help keep the employees well and that these medical attentions are not in any sense a philanthropy but a very decided economy to the Health Department as well as to the taxpayer.

When any particular kind of work is found to have an injurious effect upon the health of the employee, a change to some other kind of employment should be made.

Periodical examinations can be made an important aid in correcting the alarming mortality of middle age in this country. If diseases are detected in their incipency before impairment has become pronounced, and if the body is protected against possible injury by constant vigilance, a vast improvement would soon be effected.

The example of the New York Health Department should be followed by all the City Departments because of the economic value to the employer as well as to the employee.

RESIGNATIONS.

DR. EDWARD G. BIRGE has resigned as director of the state bacteriological laboratory at Jacksonville, Fla., and has been succeeded by Dr. Burdett L. Arms, chief bacteriologist of the Alabama State Board of Health.

APPOINTMENTS.

DR. ELLIOTT WASHBURN has resigned as superintendent of the Rutland State Sanatorium to accept the position of superintendent of the municipal hospitals in Kansas City, Mo.

PROFESSOR E. V. MCCOLLUM of the University of Wisconsin has been appointed to take charge of the department of chemistry of the new school of hygiene and public health which the Rockefeller Foundation has established in connection with the medical school of the Johns Hopkins University.

PROFESSOR FRANK C. BECHT of the University of Chicago has been appointed professor of pharmacology in Northwestern University Medical School, succeeding Professor Hugh McGuigan, who has become professor of pharmacology in the University of Illinois.

DR. A. E. LAMBERT has been appointed professor of histology and embryology in the college of medicine of the University of Vermont.